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Indian Council of Medical Research

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Research in Medical Education

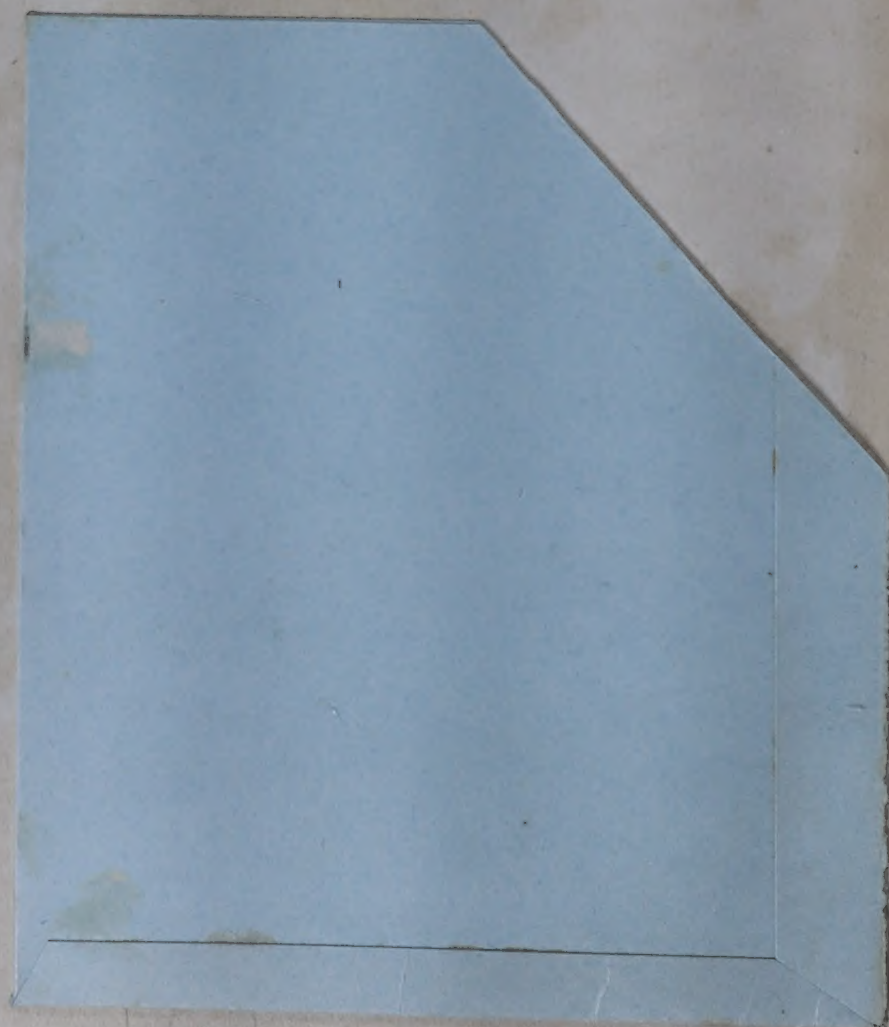


Indian Council of Medical Research
Medical Enclave (Ansari Nagar)
NEW DELHI

(1970)

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COMMUNITY HEALTH CELL

1 St. Mark's Road

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CONTENTS

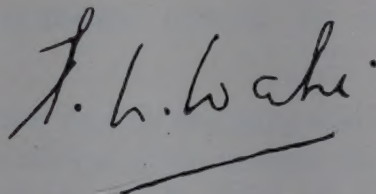
	PAGE
<i>Introduction</i>	(i)
Research in Medical Education (By PROF. P.N. WAHI)	1
Changing Concepts in Medical Care and Education (By DR. JACOB CHANDY)	9
Student Motivation (By DR. M. THANGAVELU)	15
Re-appraisal of the Traditional Curriculum: Introduction of New Disciplines (By DR. K.N. RAO)	17
Need to give new look to the educational methodology: Re-orientation of Medical Curriculum towards Self-education (By PROF. USHA K. LUTHRA)	49
Examination Methods : Newer techniques and principles of construction and evaluation of different methods (By DR. H.D. TANDON)	53
Teachers in a Medical College: Is it desirable to teach them: How to teach them ? (By SURGEON REAR-ADMIRAL B.L. TANEJA)	65
Medical Administration—A Speciality (By DR. L. MONTEIRO)	69
Post-graduate Medical Education: Need for Re-appraisal (By DR. K.L. WIG)	75

Introduction

EXPERIMENTATION in Medical Education has become an obligatory objective of a Medical College today. Self-scrutiny, re-appraisal, definition of objectives, and experimentation in Medical Education should be the primary objective of the Educational Programmes. Such programmes in Experimentation in Medical Education, though comparatively new in this country, have been in operation for sometime in Western Countries.

At a time when Medical Educationists in this country are considering the re-orientation of our educational concepts and introduction of newer curricula and methods of teaching so that the time spent by the student in a Medical College is better utilised and results in more useful doctors than at present, constant experimentation in Medical Education is necessary to find out an acceptable solution to some of these new problems.

The Indian Council of Medical Research constituted an Expert Group on "Research in Medical Education" which met in Madras on 16th and 17th December, 1969, to discuss the possible lines on which Research in Educational Methodology should be conducted in the country. The Working Papers presented in this Meeting have been compiled in this volume and published as an ICMR Technical Report Series.



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Indian Council of Medical Research

Research in Medical Education*

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MEDICAL Education in India, as in every other country, is in ferment. Fewer subjects have been so much discussed in recent years than medical education. That there is discontent with the present system of medical education, its organisation, presentation and contents, not only in India but all over the world, is being borne out by a large number of conferences, symposia, institutes and seminars that have been held within the last few years. The cause of this discontent could probably be that in the training of our doctors, we have been following an educational policy whose purpose has never been clearly defined, understood or universally accepted by the educators, the students and the public. The accepted need for re-orientation of our educational programmes has been high-lighted by the social change in the country during the last two decades, leading to demand for better medical care and preparedness of the future doctors to handle completely the medical problems created by ever-increasing specialisation of knowledge.

In view of the widespread interest in health, and the rapidly changing scientific and social science of medicine, it has almost become obligatory on medical educationists to define 'the attributes, responsibilities and educational needs of the physician of the future'. Peter Lee has correctly assessed the situation when he says that, '*in the midst of this climate of change, it is hardly surprising that medical schools have been undergoing an unprecedented period of self-scrutiny, re-appraisal, definition of objectives, and experimentation*'.

In order to answer the critics of medical education that it has failed to create physicians capable of practising modern scientific medicines to meet the health requirements of the country, experimentation in medical education has become an important activity of the medical faculty programme. The World Health Organisation, considering the paramount importance of this problem, has established a new unit 'charged with conducting and promoting research in education of the health profession'.

*Paper presented at the First Meeting of the ICMR Ad Hoc Group on Research in Medical Education, at Madras, based on the Key Note address at the Eighth Annual Conference of the Indian Association for the Advancement of Medical Education, held at New Delhi in January 1969.

Such programmes of experimentation in medical education, though comparatively new in this country, have been in operation for over a decade in some of the western countries. I would like to draw your attention to the Report of the Eighth Teaching Institute of the Association of American Medical Colleges held in 1960, where under 'Medical Schools and the Changing Times' Lee has comprehensively discussed nine Case Reports on Experimentation in Medical Education during the period 1950-60 from different universities. According to him, two major movements and trends have dominated experimentation in medical education in U.S.A. over the past decade. The first has been an 'increasing concern with the necessity of better preparing the student for his fundamental task in medicine, to deal effectively with patients,' and the second 'a concern with ways of dealing effectively with the increasing body of specialized knowledge essential to the understanding of modern scientific medicine'.

The above two main objectives are of equal significance in our medical educational programmes as playing a major determining role in shaping the finished product, *i.e.*, the doctor who will continue to contribute to medicine as an art, who will be actively interested in the progress of medical research, and will be able to tackle successfully ever-arising problems in medicine. If we feel that for effective teaching of medical students, a constant appraisal of our methodology is essential to ensure this achievement of our ultimate goal, the experimentation in medical education becomes an important programme of every medical faculty.

I would now briefly outline some of the problems which I consider of central importance to medical education in the coming years, the successful solution of which may go a long way to raise the standard of medical education in this country as also to better preparing the student for his ultimate task of providing scientific medical care to the community.

Student Selection

The problem of selection of students for medical education is still unsolved. With the increasing population and greater need for doctors, medicine in this country is not attracting the students with best academic records. This is resulting in high attrition rate and lowering of standards. We have to ask ourselves as to how good a doctor we need? Should the medical education be confined to a fewer admissions with good academic record, as was the case when we were students, or to larger admissions where students with average performance in their pre-medical course have to be taken in. We have also to evaluate the validity of our criteria, especially when there is wide disparity between the various methods employed for the selection of students. At many places, it is achieved by holding a pre-medical test and selection of candidates in open competition. Here too, the subjects prescribed for the test may differ from place to place. At other places, the selection is made on the basis of the marks obtained at the qualifying examination. At most of the institutions there is no *viva voce* examination, or any other method to judge the aptitude of the candidate — 'a study of humane and non-intellectual attributes of candidates (Lee)'.

It is generally felt that the existing methods of selection are defective as too much emphasis is placed on scholastic qualifications, disregarding the aptitude of the

student. The admission requirements being so rigid, the prospective medical student has a narrow educational background, especially in humanities and social sciences. This results in unrealistic concepts of motivation. The learning process of a student is to a considerable degree affected by his motivation. I agree with Rusell Meyer when he says that 'in fashioning technics for teaching and learning, consider motivation in parity with intellectual capacity, physical health, emotional stability, socio-economic status, previous educational backgrounds and habits of work'.

There is no systematic data available on the subject of socio-economic status, career motivation, and career aspiration of medical students in this country. The important constituent in the process of medical education, the medical student, remains to be studied. At the S. N. Medical College, Agra, a research project (ICMR) is under study to collect the baseline data concerning socio-economic status of medical students in India, to study the factors motivating selection of medicine as a career by Indian medical students, to estimate the effect of student personality, attitudes, and values upon learning, performance and career aspirations. It is also proposed to compare the results with those of similar studies in other countries, particularly Asian. This information on Indian Medical Students may be of benefit to medical educators in India and, if disseminated to other countries, may strengthen the educational opportunities for Indian graduates seeking higher training.

The results of such studies can usefully supply information regarding socio-economic status of Indian medical students, their attitudes, personality, motivation in respect to career and examinations, post-academic aspirations, academic performances, nature and frequency of problems faced by them and the adaptational problems. The data may further help in providing an answer to the important problem of graduate migration abroad and mal-distribution of doctors between rural and urban areas within the country.

The formulation of criteria of selection of students for the medical courses, and study to find the means to attract the best talents of the country to the medical profession, should be considered as an important field of medical education where experimentation can be usefully undertaken.

Pre-medical Education

The recent reorganisation of the secondary education in this country, with the provision of a Higher Secondary course, has seriously posed the problem of pre-medical education as this course will not provide an appropriate educational background for the prospective medical students. Introduction of a pre-medical course, extending over a period of one year prior to admission to a medical college, has to be seriously considered. The question of curriculum content of such a course and the role of universities in this training programme, are other important questions to be answered. Should this course consist of the traditional training in Physics, Chemistry and Biology or should it be more broad based and suited to the present day trends in medical education by inclusion of subjects like humanities, medical statistics, element-

ary genetics etc. His preparation for the future requires not only essential knowledge of biology, physics, chemistry and mathematics but, above all, of the proper attitudes and sense of values.

Role of University in Medical Education

The question that is being constantly debated is where this pre-medical training should be imparted, *i.e.*, in the medical college or in the science college of the university, and how the university should be integrated with medical education? It would be desirable to organise such a training in the university, as it is being realised that the university should play a more positive and active role in medical education.

The proposed practice of giving pre-medical instruction in medical colleges ignores the most important distinction between professional institution and university training, an inescapable distinction. In the professional college, an element of didactic authoritarianism is probably necessary in teaching, since the average young mind finds difficulty in grasping the full implications of the scientific method with its emphasis on accuracy, quantitative observation, the designed experiment, controls and statistical tests. In science, there are no opinions, no ideologies; only facts, measurements and correlations, upon which are based hypotheses with no transcendental merit of their own but depending on the observations they claim to integrate. To instil this attitude, to adapt to these ways, and keep up the analytical and humanitarian attitudes in the student is the first and most important duty of university education, and it must remain its exclusive prerogative not for any petty monopolistic reasons but because it is only in an institution where devotion to research and discovery exists on a parity with teaching in the humanities that such a tradition flourishes. Instruction at university level has another quality which distinguishes it from professional learning, that is, continued emphasis on the unknown. In fact, it has been said whimsically that the educational function of a university is to teach what is not known. Engaged equally on research and teaching, the university teacher avoids that element of didactic authoritarianism which, useful as it may be in the professional teaching, stifles enquiry and is the negation of the scientific outlook.

The varied subjects of medicine can be fully appreciated by mature minds and it is only with the university participating in the medical education that this can be achieved. The special programme of Johns Hopkins, North Western, and Boston Universities to explore the feasibility and extent of integration of university and medical education are worth a serious study. To quote from the Proceedings of the Eighth Teaching Institute, 'these include the desire to shorten the curriculum, to bring the medical school closer to its parent university, to improve the overall educational experience for the student, to select students for the study of medicine at an early age, and to strengthen the education of future teacher and investigators in the basic medical sciences'.

The Medical Curriculum—Its Re-organization

There is a feeling of general dissatisfaction amongst the teachers as well as the students with the existing curriculum. Medical education is dynamic and the rapidly expanding knowledge has created a crowded curriculum. Unfortunately, all attempted reforms have been piecemeal, half-hearted, and have only succeeded in adding more to the over-burdened medical curriculum. The Medical Education Bulletin of the W.H.O. Regional Office has very rightly suggested that "small adventures in reform will not avail unless they are grafted on to a stump (determination to create a practitioner student of medicine worthy of the name) from which all rotten branches have been amputated and whose future growth can be wholly nourished by a completely 'new look' at medical education". This is essential if the goal is to make it possible for the student to organise his knowledge and to develop attitudes which enable him to see his patient as a whole.

To achieve this objective, our concept of teaching methods, both theoretical and laboratory teaching, will need complete overhauling. The present medical curriculum of set lectures and demonstrations etc., will have to be replaced to a large extent, by techniques encouraging self-education, *e.g.* small group projects, conferences, seminars, tutorials etc., in which the student is the major participant. This would help him to develop considerable independence of thought, habit of logical thinking, sense of responsibility and initiative, besides a sound knowledge of the subject matter involved.

Provision of elective time or free time in the curriculum of a medical student may be usefully considered in the re-organised pattern. This is the time spent by the student on self-education, providing him with an opportunity for advanced study in the subject of his own choice which is not otherwise possible in the set class-room didactic teaching. It is desirable that the student should get time to browse around on his own to read medical journals, to meet patients informally, and to adjudge his practical and theoretical training. This would help to form his own ideas and opinion of what he is learning. This would inculcate in him a desire for a balanced curriculum, training him to be a doctor for a vocation with a love for learning and knowledge so that he remains for ever a student and a researcher. During this period, he is encouraged to work in basic science departments and be incorporated, if possible, in the research projects. Elective time could also be utilised to provide a few students with an opportunity to accelerate their programme of study as is done at the Johns Hopkins University.

Another training procedure which we have successfully adopted is the introduction of experimental methods whereby a student learns a disease process by performing experiments as a part of the curriculum.

Integrated teaching or introduction of correlated teaching programme in the medical curriculum should also be considered. This will not only help in shortening the syllabus, reduce the cost of medical education, but help in producing a doctor capable of viewing the patient as a whole. As an example, the social sciences could be taught

as an integrated course to enable the students to appreciate the role of psychological and social factors in the production of disease. Such a programme would be particularly helped by organisation of multi-discipline laboratories. This is an important contribution of the Western Reserve University to the concept of integrated teaching. This has 'helped the school to enable the interdepartmental teaching to take place effectively, provided the medical student a place of his own for laboratory work or study, besides providing the obvious economic advantages, eliminating the wasteful duplication of traditional departmental teaching laboratories'.

Examination

Closely related to the apparent necessity for re-organisation of the medical curriculum and for constant evaluation of these programmes, is the need for a critical evaluation of our examination system and the high attrition rate. The present system of examining a candidate at the end of the full course by a university examination is more a test of his capacity to memorise the lesson rather than an assessment of his educational achievements. Besides, the high failure rate results in waste of time, energy and expenditure on the part of medical student as well as the college. I would quote the University Commission, 'Every failure represents a personal tragedy for the individual and an unrealised return on this investment in time and money which an institution has made in the student education'.

General Practice

An important avenue for experimentation is to design studies to provide an answer to the constant criticism of our educational programme that it does not prepare the student for general practice. This is evident from the career which the medical graduates usually adopt when only a minority enter private practice.

One of the inevitable consequences of rapid growth of knowledge is the evolution of specialization. The Medical Colleges, in their effort to advance medicine as a scientific discipline, have developed their teaching programmes such that they lead to extreme forms of specialisation. The general physician has almost disappeared from our teaching staff, and the medical curriculum is taught by different specialists. The unfortunate result has been that by the time post-graduate education has been completed, the doctor finds himself most reluctant to settle as a general practitioner.

It is desirable that the student should be given opportunities to learn some thing of the work of a general practitioner. This could be done either by spending the internship period with a general practitioner in the educational programme of the college or the general practitioners be encouraged to bring their cases to the teaching clinics, and to attend the Radiology and Pathology Department Conferences. They could be given hospital appointments and partake in out-patient teaching. Their impact on students would provide the latter with some experience of the problems of setting up general practice. The student could also follow the patients from ward to their homes. The colleges of general practitioners may be invited to advise the medical colleges regarding the training for general practice. Like other

specialities, general practice is also to be considered a speciality and regular training should be provided. However, the necessity to experiment to find out the best means to achieve this objective is obvious.

Another problem facing our medical education is the tendency of graduates towards urbanisation. It is paradoxical that while 82 per cent of the country's population live in villages, the young graduates do not wish to practise medicine in rural areas. It is possible that the doctors do not find conditions in villages suited to their way of life and also find that the dispensaries are ill-equipped, ill-staffed and ill-financed. But we cannot ignore unrealistic medical curriculum of our colleges where there is no provision for training of students in rural areas. Different approaches to the problem should be evaluated to make medical education more useful to the country.

There is another problem to which we should give serious consideration, i.e. youth unrest, a phenomenon prevailing in educational institutes all over the world. Though I admit that the medical institutions, by and large, are comparatively free from disruptive tendencies on the part of the students, yet in Paris the major participation was by the medical faculty. We cannot just pass this off by laying the blame on the students, or their parents for wrong upbringing. We should do a little bit of heart-searching and try to find out if the institutions have done their duty towards the students. The youth measures his prospects by his status in society, his rights and social duties. If the young people have all opportunities to develop their abilities, desires and potentialities, they can be confident of the future. They are eager to feel responsibilities, not only for the future, but for the present as well. I think, we should seriously consider the sharing of control of academic and administrative activities of the college with the students. They could be members of the Library Committee, advising the Principal on the management of Library. They should be consulted regarding formulation of curriculum. I would go to the extent of suggesting that they should be occasionally asked to evaluate the teachers of the teaching programmes. Constant experimentation is necessary to evaluate methods by which the students could be made to realise that they are active participants in a great creative and cooperative endeavour in which not only the standard of education but the whole performance of the institution depends.

Answer to these problems must be provided keeping in view the socio-economic background of the country. Results of experiments in medical education, carried out in other countries and being now organised by the W.H.O., would be useful. For a realistic approach we should institute our own research projects. To my mind, Division of Research in Medical Education should be created in some medical faculties and the projects should get active support of the Indian Association for Advancement of Medical Education or the Indian Council of Medical Research.

Some of the problems which, I think, need urgent solution, are:

1. Student selection and the validity of the criteria *vis-a-vis* prevailing socio-economic conditions and educational background.
2. Study of student motivation and its impact on his performance and career aspirations.
3. Pre-medical education and its curriculum content.
4. The medical curriculum and its reorganisation. Evaluation of different types of programmes. The problem of over-accumulating medical curriculum, appraisal of teaching methods, provision of elective time, introduction of experimental methods and formulation of correlated teaching programmes.
5. Integration of universities and medical education.
6. Methods of assessment of student's performance.
7. High attrition rate.
8. General practice.
9. Relation of medical education to national health planning, with special reference to reluctance of medical graduates to serve the rural society.
10. Incorporation of medical students in academic and administrative organization of the institution.

Concluding, I would say that medical education in India today represents a colossal problem with an obvious impact on nation-wide consciousness for re-adjustment to the present and future needs of the country. The medical educationists are considering the re-orientation of our educational concepts and introduction of newer curriculae and methods of teaching so that the time spent by the student in a medical college is better utilised and results in a more useful doctor than at present. The defect in our medical education becomes evident when we analyse the quality and performance of our graduates. There is no denying that there has been gradual lowering of the standard of the medical graduate being produced. This has been further accentuated by the acceleration of medical education and increasing number of admissions to the medical colleges made necessary by the needs of the country. Constant experimentation in medical education is necessary to find out an acceptable solution to some of these problems.

Changing Concepts in Medical Care and Education

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POSITIVE health is one of the important ingredients of the good life that our nation should assure for every citizen of India. The efforts towards this goal over the last two decades have concentrated on increasing the number of medical colleges (from 30 in 1951 to 94) and the number of medical graduates produced (from 2,500 to about 12,000 per year) and on developing a system of Primary Health Centres, Taluq Hospitals and Headquarters Hospitals. At the same time, efforts have been made to improve the quality of teaching and research work by upgrading many departments in various hospitals and medical colleges, as well as by setting up the Institutes for Post-graduate Training and Research in Delhi, Chandigarh, Pondicherry, etc. But a review of our achievements through these considerable and expensive efforts show that we are yet to achieve the goal of assuring to the maximum number of people, the maximum health facilities which are within the reach of our resources and scientific knowledge. This note is an attempt to analyse the reasons for our failure and to suggest some new directions in which we may pursue this goal more effectively.

One may anticipate the ensuing analysis by stating the basic contention that this failure is because the medical services have concentrated on expanding the pattern of facilities laid down by a paternalistic foreign government, no doubt with many empirical modifications, but without undertaking an agonising re-appraisal of the entire system according to the socialistic goal of ensuring for every member of the society the best care feasible within the nation's resources. The medical profession too has been more interested in improving and expanding the profession and its technology rather than modifying the profession to meet the objective of making available a reasonable degree of care to every man. The emphasis has continued to be on a doctor sitting in a hospital to whom the sick individuals come and who dispenses curative services in the overflowing out-patient departments or in the crowded wards; the developmental efforts have been to increase the number of such doctors and such hospitals. Since the resources available for such expansion had to be stretched to the maximum, the quality of medical colleges and the facilities of the new Health Centres have tended to

deteriorate. And, as the limitations of this curative-oriented medical service became increasingly apparent, there has been some effort to modify the training of doctors so that they receive a fairly large dose of the so-called Preventive and Social Medicine. But this was simply an appendix added on to a curriculum which is thoroughly curative-oriented and was in the charge of a Department which itself had little opportunity to practise what it taught. The product of such a training programme is a growing army of young doctors who are both unwilling and incapable of running effective health services for the rural and semi-urban communities of our nation. Thus the failure to define the full implications of socialistic objectives in the medical field and to re-arrange the educational programme to produce medical personnel oriented towards these goals is responsible for our slow progress in health services.

This diagnosis of our deficiencies is based on the following considerations. From the very brief summary in the first paragraph it will be seen that the basic philosophy of our current efforts has been to expand and enlarge our present pattern of medical care till it gradually percolates to the level of every villager, and this approach needs careful scrutiny on the following points:

1. Will this ensure the best use of our resources in the foreseeable future to the benefit of the entire population ?
2. Even apart from the inevitable restrictions of our predicament, is this a reasonable approach for a national health programme ?

These two aspects are considered in detail in the next two paragraphs.

It is considered necessary to have one doctor for every thousand of population, and one hospital bed for every 500 of population to maintain an adequate health service of the present type. If these requirements are to be met by the end of 1980 we will need 700,000 doctors and 1,400,000 hospital beds with all the necessary ancillary personnel and services to support them. Even if the ambitious projections in our present Five Year Plan are fulfilled, we will have only 130,000 doctors and about 300,000 hospital beds by 1971. And if we suppose such rates of expansion (*i.e.* increase of 12,000 doctors per year and 25% increase in the number of beds every five years) by 1980 we will still have only 250,000 doctors and 470,000 hospital beds, which will be only about a third of the optimal numbers required by that time. In other words, it is impracticable to expand our existing medical facilities in the foreseeable future, to make available to every citizen a pattern of health care that we have inherited. But even assuming that such an expansion were possible, can our economy sustain such a health care system? This may be simply answered in the following way. To bring our present type of services to optimal levels, a five-fold increase in personnel and facilities is required. But even at best our per capita income can increase only by about 40% in ten years. Or, in other words, the disparity between the probable expansion of the economy and the required expansion of medical services is 1:10; the improvement

of our resources will permit only about a tenth of the required expansion in health services. It will be clear from this very brief analysis that it is impracticable either to expand the present pattern of medical services till they are quantitatively adequate to meet the needs of the nation or to sustain such a medical service even if such levels of expansion were feasible.

The other question is whether the present type of medical service is the ideal one for the average citizen, even if we were able to expand and financially sustain it according to the standards of the developed countries. The best example for this state of affairs would no doubt be the U.S.A. The whole position there may be summarised, and not unfairly, by saying that this is the country where the average person is most afraid of falling sick, because of its financial consequences. In spite of the high level of medical technology and the highest standard of living in the world, it is not possible to assure the average person the level of health care which one might reasonably expect in such a society. Thus it is clear that a pattern of medical service that pursues curative medicine of the highest order as its main objective cannot meet the needs of the people, however advanced the professional technology and however large the number of doctors and hospital beds available.

And this is not a matter of the political system of the country either, as can be seen from a look at another well-developed country where socialistic ideals prevail in regard to health care, namely Britain. Even though the National Health Scheme there is in a great measure assuring the basic health care of the average citizen, Britain can be said to have the most-disgruntled medical profession in the whole world. Hence, the low ratio between the number of applicants to medical colleges and the number of seats available for admission there. Hence also the great exodus of British doctors to Australia, Canada, and New Zealand, leading to the vacuum which Indian and Pakistani doctors fill much to the detriment of their own homelands. The problem there is that the government has more or less accepted a socialistic goal in this field but the training programme for the future doctors does not prepare them for the same, either professionally or psychologically.

We may now summarise the basic points that emerge from the discussion above.

1. The prodigious expansion of our health services in the last two decades has not paid corresponding dividends from the common man's point of view.
2. Further quantitative expansion of medical services along the same lines till it becomes available to every citizen is not feasible in the next decade or two.
3. Even if such an expansion were feasible, such a service cannot be financially supported by the levels of affluence that we are likely to attain by then.
4. Even in well-developed countries, a curative-oriented medical profession

cannot meet the common man's need, in spite of adequate quantity and technical excellence.

5. Even when a country establishes nationalised health scheme, this cannot fully succeed unless the orientation changes from curative medicine to comprehensive community health and, more important, unless the pattern of medical education changes so that the future doctor will emotionally accept and be professionally competent to deliver that kind of health care.

If these conclusions are accepted, at least in their essentials, then the implications for our country and for the planning of her future medical profession are obvious.

(1) Firstly, emphasis in the health services should change from provision of curative services to the establishment of comprehensive health care system. Further plan outlay should be not mainly to increase the number of medical colleges or the hospital-centred curative facilities, but to develop a broad-based community health programme where the available doctors will operate as the care-takers of the social welfare of the people, with the aid of para-medical workers at various levels. If one doctor only is available for the care of 5000 people, let him take the entire community as his ward and not care episodically for those who succumb to illnesses and are best able to pay for such curative care. Thus the expecting mother, the new-born baby, the child in the school, nutritional status of the school lunch programme, planning of families, sanitation in the community, should all be his concerns. Obviously such a broad-range of supervision will be possible only through involvement in all these with the aid of suitable social workers, dieticians, public health nurses, sanitary inspectors, etc. What is required is not so much the establishment of a national health scheme of the British pattern as a socialisation of the objectives of the medical profession. If doctor's training has oriented him in this direction and has also given him the proper know-how for taking care of a community on such a broad basis, then his work, even with the present limitations, will ensure a better standard of health for the whole community than is available now or is likely to result from the present developmental plans.

(2) But any such plan can succeed only if we produce a generation of doctors whose whole concept of their vocation is different from that at present. They should see medicine as a potent weapon for creating a healthy community and not merely as a highly sophisticated science for the care of the ill. A revision of the present pattern of medical education with this objective is not easy, particularly if this socialisation of goals is not to result in a watering down of the scientific content of medicine. But even more insuperable than this inherent difficulty is the fact that the medical profession, which has the right to control itself and the training of its future practitioners, has not shown such a change of heart either in this country or elsewhere. Therefore, it is unrealistic to expect that, given time, the required changes will gradually evolve out of the present medical educational pattern. One feasible solution to this problem is to select one or more of the best medical centres in this country and offer them the

freedom to remould the teaching and practice of medicine on the assurance that their products will be accepted into the medical services of the country. Given such freedom, if they evolve a proto-type which can meet the needs of the nation, then it will be up to the nation and the medical profession to decide if that is not the direction in which the entire national health service should evolve.

It is not possible in this note to elaborate in the details of a curriculum which will achieve this re-orientation, but suffice it to say that the subject of medical studies will be not only the illnesses of the individual man, but the factors which govern the well-being of the whole community, and the future doctor will be trained not only in the hospital wards and laboratories but also in typical communities where socialistic medicine is being practised. And Preventive and Social Medicine will no longer be a subject added on, however elaborately, to the medical curriculum, but instead Community Health will become the connecting link and philosophical basis of the entire medical course. Given the freedom to break away from conventional notions, it is not impossible to evolve such a training programme. And given a willingness to change the present health services themselves, such a medical centre can show in a reasonable time that within the available resources, they can do the maximum good to the maximum number of people.

Today we are on the verge of some dynamic developments in our nation. The goal of socialism is being taken more seriously, and it is realised that if the government does not become more revolutionary in its willingness to serve the people, then the people will hand over the government to revolutionaries. In this context, the medical profession, particularly the medical educationalists and the planners of national health programmes, face on the one hand the insistent demand of an impatient public that their needs be effectively met and on the other hand the unique opportunity to remould the medical practice and education to meet this demand.

Student Motivation

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Trivandrum-11

IN a fast developing "developing country" whether one considers the need for motivation in any field of education, is worth questioning. There is keen competition for advancement, but unfortunately the unmotivated is over-ambitious to achieve wealth, honour and lastly standards which alone can guarantee sustained progress.

The society has yet to develop a serious concept concerning its needs, and demand measures for providing the society with properly motivated physicians. Even today the medical education is looked upon as a profession meant for self-advancement of the individual who qualifies as a physician. It is never thought of in terms of social investment for the betterment of social health, and the individuals trained at great cost to the community do have a responsibility for the preventive and promotional health care of the community. So, social motivation is an important element in student motivation. Central and State legislation may be necessary to bring about changes in the attitude of the citizen when he seeks facilities to get his children trained as a physician.

Student motivation for a professional career should begin early in life. Even at the high school stage he should be exposed to the life and ideals of family physicians, rural medical practitioners, medical institutions like hospitals, research centres etc., situated in the neighbourhood. He should be encouraged to associate himself as an apprentice during holidays or vacation. At the time of selection, credit should be given for such participation.

During the period of training as a medical student, no opportunity should be missed to encourage him to participate in clinical and laboratory services. Those students who are considered intellectually superior should be chosen for association with departmental teaching and research activities. Academic credits or financial incentives may be necessary for developing these programmes. Each institution must have some special funds for meeting such commitments without involving in unending selection procedures for identifying talents. Monetary awards, merit certificates or medals, grant of travel fellowships, and assignment to part-time posts in institutions

during the study period are some of the ways by which student motivation in medical science can be fostered.

A teacher plays an important role in student motivation. The teachers in science and humanities should highlight the noble objectives of the profession, illustrate the achievements of the contemporaries in the medical world and indicate the widening horizon for earning name and fame in the pursuit of a professional career. The medical teacher is perhaps the greatest motivator. He should demonstrate and then preach the ideals of the profession for which he is offering training. There is often a conflict in the role we play as a physician, teacher or research worker and this often causes confusion in the minds of the young. The role of the medical teacher in advancing social interests, and perhaps a training for him in motivating his students, may be discussed by the Group.

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Re-appraisal of the Traditional Curriculum: Introduction of New Disciplines

Dr. K.N. Rao

Executive Director

Indian Association for the Advancement of Medical Education

Madras-5

1. "Medical Education in the Service of Mankind" was the theme of the 3rd World Medical Education Conference held in India in October, 1966¹. After the Conference, sweeping reforms in Medical Education were expected in the developing countries, or at any rate in India where there is the greatest need, but to the disappointment of all, only a few ripples are seen so far. On the threshold of the seventies, there is a silver lining. The I.C.M.R. has appointed (1969) an *ad hoc* Committee on Research in Medical Education. The Medical Council of India in its quinquennial programme formed a Committee (1969) to review the Undergraduate and Postgraduate Medical Education.

To adapt medical education to the mounting challenge of the 20th Century revolution in Science and Technology and to the rising expectations of the people, and the imperatives of social progress as proclaimed by the agencies of the U.N. system like the W.H.O., there is an urgent need for re-appraisal of the Medical Education System and more particularly of the traditional curriculum to estimate its inadequacies as suggested by Rao (1966)^{1(a)}. It should however be understood that the curriculum is no more than the structure of medical education and the structure is given significance by the spirit that forms it and the functions that are fulfilled within it. The four components of the instructional programme, i.e., the educational objectives, the organisation of the curriculum specially with respect to the application of education principles, instructional practices, and the student evaluation are inter-related and should therefore be kept in view, besides faculty attitudes and the students' view of their College, their faculty etc. (the climate for learning) in any appraisal.

2.1. The Medical Council of India, the statutory body that is empowered to regulate Undergraduate and Postgraduate Medical Education in India, makes recommendations to the Universities and Governments. The recommendations adopted by the Medical Council in November 1964 and June 1965² (Annexure I) are now in force,

2.2. General education and preliminary scientific education

Broadly, students entering Medical Colleges have 10 years of school and two years of College education (Intermediate) with Physics, Chemistry and Biology, or 11 years of Higher Secondary and one year Pre-medical course with Physics, Chemistry and Biology, or 10 years of Secondary Education plus one year Pre-university and one year of Pre-medical course with Physics, Chemistry and Biology in the Medical College.

2.3. Medical Course

The Medical Course should consist of four-and-a-half years study which is phased as Pre-clinical for 18 months ($1\frac{1}{2}$ years) and Clinical for 3 years. In the Pre-clinical phase, Anatomy, Histology, Embryology, Physiology, Biochemistry, Psychology, Statistics, Social and Preventive Medicine are to be covered. In the clinical phase, Pathology, Microbiology, Pharmacology, Forensic Medicine and allied specialities, Surgery and allied specialities, Obstetrics and Gynaecology and Social and Preventive Medicine are included. Paediatrics should get three months clinical clerkship, one month each taken out of Medicine, Surgery and Obstetrics and Gynaecology. The Medical Council of India has also emphasised the early introduction of the patient in the pre-clinical period, vertical and horizontal integration in the teaching of subjects, the need for reduction of didactic lectures, the utility of seminars, conferences, etc. Compulsory internship for one year at the conclusion of formal education in the College was also recommended.

3. In a recent survey conducted by the Medical Council of India, the present situation was found to be as under, in 40 Medical Colleges:

3.1. Preliminary Education

The minimum educational qualification prescribed for admission to the M.B.B.S course was as follows:

Pre-medical	7
I.Sc.	13
B.Sc. Part 1 (1st year)	4

In 9 colleges, candidates were admitted to the integrated course of $5\frac{1}{2}$ years + 1 year internship, after Higher Secondary and Pre-university course. 20 colleges required 12 years, 8 colleges 14 years preliminary education, and one College 14 years including Pre-medical for admission to the Pre-clinical courses. In most of the colleges only English, Physics, Chemistry and Biology formed the subjects for Pre-medical course, one College only had humanities in addition to the above.

3.2. Selection of Candidates

Different States have different criteria. Many candidates are admitted on merit in the general education mark, with or without interview. Reservations varied from 15 to 25%.

3.3.1. Medical curriculum

There is still no uniformity in the duration of the course. A few Universities have still two years Pre-clinical and 3 years Clinical and six months of Internship. By and large the $4\frac{1}{2}$ years course plus one year internship is the rule in all the Universities except the Universities in the South where there is the integrated $5\frac{1}{2}$ years course plus one year internship.

3.3.2. Pre-clinical period

This stage is devoted mostly to Anatomy, Physiology and Biochemistry. Out of 32 Colleges, 12 do not teach Biochemistry separately. 16 Colleges teach Biochemistry as a separate subject and devote between 120—540 hours; Anatomy 600—1100 hours. Physiology takes 400—800 hours.

In most of the colleges, students are neither exposed to work in the hospitals nor patients introduced in the Pre-clinical stage. In a few medical colleges, cases are demonstrated in the Physiology classes, and in some colleges students are taken to the Hospital Outpatient Departments. Social and Preventive Medicine is not taught in the pre-clinical stage in the majority of the Colleges. A few colleges give instructions in normal psychology.

3.3.3. Para-clinical and clinical period

The following statement shows the minimum and maximum hours devoted to didactic, demonstrations and practicals for the different subjects:

	<i>Didactic</i>		<i>Demonstrations</i>		<i>Practicals</i>	
	Min.	Max.	Min.	Max.	Min.	Max.
Pathology/Microbiology	40	275	20	225	60	360
Pharmacology	50	263	10	288	30	240
Forensic Medicine	30	165	10	125	6	80
Social & Preventive Medicine	40	300	10	240	24	600
Medicine	72	252	52	648	72	800
Surgery	64	470	48	1860	72	720
Obst. & Gyn.	38	312	16	482	90	360
Ophthalmology	12	150	12	310	72	315
E.N.T.	6	53	6	48	24	240
Anaesthesiology	6	18	6	25	6	120
Orthopaedics	2	36	6	34	22	240
Radiology	6	30	6	20	10	240
Dental	5	16	6	50	10	50
Venereal Diseases	5	20	6	25	15	50
Paediatrics	10	40	6	50	15	24
Psychiatry	6	78	6	36	10	240
T.B.	6	20	6	30	16	120
Dermatology	5	15	6	25	15	240
Acute Infectious Diseases	6	26	6	20	15	120

It may be noted, Paediatrics is not given the requisite time in spite of the Medical Council of India recommendations. Only 15 colleges have introduced some sort of vertical and horizontal integration. In a few colleges it seems to have met with some success. Most of the colleges have not reported of any special features.

3.4. Examinations

They follow more or less on the pattern of the Medical Council of India recommendations. In 20 colleges there is some sort of day-to-day assessment which counts towards 10-30% of marks for the University Examinations. In 12 colleges this is not in operation. Essay type of questions are the rule.

3.5. Internship

A few colleges still have six months internship (5 years course) instead of one year for $4\frac{1}{2}$ years course. Some colleges permit specialities also to be done in the internship period. Rural training is done in the Primary Health Centre. There are no data on the methods of teaching, educational objectives, evaluation methods and educational outcomes.

4. Recommendations of Committees and Conferences in India

4.1. The Health Survey and Development Committee (1943-46)³ made exhaustive recommendations on Undergraduate and Postgraduate Medical Education (pages 336-376 of Vol.II and Appendix 28 of Vol. III). Under educational principles, it is stated that "The Aim of Medical Education is to produce a body of medical men, capable of maximum service to the Community." "Preventive Medicine must now come to the forefront and the duty of the profession should be to prevent rather than to cure. The promotion of health, the prevention of illness and the treatment of disease should all be dealt with in the curriculum but greater emphasis must be placed on the first of these than has been the case in the past."

Detailed recommendations were given as under:

- (a) General education at School or University
- (b) Preliminary Scientific Education
- (c) Preclinical Scientific Education
- (d) Clinical Education
- (e) Medical Examination
- (f) Internship

They recommended that Elements of Statistics should form a subject in the pre-professional studies; Biophysics, Psychology, Introduction of the Patient, etc., in the pre-clinical phase; and that Social and Preventive Medicine Department should be organised with two wings, one urban and the other rural. The scheme for the training of the basic

doctor during his Undergraduate course in preventive medicine and public health, gives the recommended structure of the Social and Preventive Medicine Department (Appendix 29 of Vol. III of the Report of the Health Survey & Development Committee)⁴.

"The main idea underlying the changes recommended in the Undergraduate curriculum include a reorganisation of the teaching, both in the preclinical and clinical fields; a reduction in the hours of didactic instruction in certain subjects and an emphasis on the inclusion of principles and methods which will enable the student *to learn for himself*, think, observe and draw conclusions; the establishment of Department of Preventive and Social Medicine in every Medical College so as to give the student an insight into the social health problems by contact with home and community life and inclusion of a year of "internship" after qualifying examinations, of which 3 months will be devoted to work in a public health unit and the remaining period in a hospital of approved standard. Throughout the whole course the importance of research should be stressed."

4.2. A conference on Medical Education was convened by the Government of India from 19th to 22nd November, 1955⁵. The Conference considered pre-medical education, selection of students, curriculum, hours, subjects like preventive and social medicine, paediatrics, psychological medicine, internship, libraries and museums, history of medicine and medical ethics, methods of teaching, examinations or assessment, electives, etc. The Conference recommended $4\frac{1}{2}$ years medical course with $1\frac{1}{2}$ years pre-clinical and 3 years clinical course. Sub-Committee II had envisaged a total number of 5100 hours for medical curriculum, distributed as 1,500 hours for pre-clinical subjects and 3,600 hours for clinical subjects on the basis of 180 working days in the year and $5\frac{1}{2}$ hours for each working day. Sub-Committee II had recommended that 25% of the students time should be devoted to elective studies and made provision for this in the suggested curriculums. The electives included are:

- (1) Repetition of classical experiments
- (2) Reviews and library reference
- (3) Elective courses which may clear up some deficiency in the student background
- (4) Advancement of knowledge in some special field of interest
- (5) Research:
 - (a) Non-clinical subjects
 - (b) Clinical subjects
 - (c) Anatomy
 - (d) Participation in field research
- (6) Study of non-medical subjects

The syllabus for Social and Preventive Medicine is distributed both in the pre-clinical and clinical phases. In the pre-clinical phase, human ecology, clinical conferences, biostatistics and field surveys are recommended. In the clinical phase, environmental hygiene, epidemiology, community organisation and public health administration form the subjects. The field experience is suggested from the 2nd year onwards on Family Doctor Plan. Coordinated outpatient department service, and integrated teaching with other departments of the college in both pre-clinical and clinical phase, are suggested. In the pre-clinical phase genetics, nutrition, medical history, demography, child growth and development, while in the clinical phase, mental health, maternal health, child health, communicable diseases, nutrition, parasitology, etc., are recommended.

4.3. The Health Survey and Planning Committee⁶ has made exhaustive recommendations on professional education which were reiterated by the Deans and Principals. The main suggestion was that the clinical course be extended by six months and to teach statistics, psychology, sociology and introduction to medicine in the first six months of clinical years.

4.4. A Conference of the Deans and Principals of Medical Colleges⁷ was convened in September, 1960. The Conference considered the high cost of medical education, teacher training, evaluation of the existing curriculum, failure rate, integration of pre-medical course, separate organisational wings for medical education and research etc.

4.5. The second Conference of Principals and Deans was held in 1962⁸ during the conflict with China. The questions mainly centred round health manpower development, doctors and specialities.

4.6. The third Conference of Principals and Deans met in 1967⁹ and discussed amongst other things the importance of social and preventive medicine, training in rural health centres, and family planning in the medical curriculum.

4.7. The Indian Association for the Advancement of Medical Education was established in 1960 with a view to bring together the medical teachers, to effect the necessary transformation of medical education.

4.7.1. At the first Conference in 1960 the aims of medical education were discussed¹⁰.

4.7.2. At the second Conference in 1961 the importance of social and preventive medicine in medical curriculum was discussed¹¹.

4.7.3. At the 3rd Conference in 1963 an "Institute" on Basic Medical Sciences¹² was conducted under the General Chairmanship of Professor P. N. Wahi. The Institute considered the objectives of Undergraduate medical education, methods of teaching, methods of assessment, and emphasis on preventive and social

aspects. The Institute laid stress on the active participation of the student in the learning process and also the need for electives. Professor Wahi mentioned about the general dissatisfaction of all with the curriculum and stressed that medical education is dynamic and that the curriculum should also be dynamic and the rapidly expanding knowledge has been crowding the curriculum which requires pruning. He also emphasised that the curriculum for the undergraduate should be distinct from that of the postgraduate and the specialist trainee in the subject. There is need for student-oriented teaching rather than subject-oriented.

4.7.4. At the 4th Conference (1964) of the Indian Association for the Advancement of Medical Education, a Teaching Institute on Clinical Sciences was held¹³. The Institute stressed the need for change in the teaching of clinical disciplines, that the objectives of medical education were to train basic doctors, that the methods of teaching should be changed to seminar group discussions type and that integration with basic medical sciences should be enjoined. The Institute underlined that the curriculum in medicine needs emphasis on local diseases and that preventive and social aspects require greater consideration. The surgical curriculum also requires emphasis of local problems and less on operative details. In obstetrics and gynaecology emphasis should be laid on antenatal and postnatal care, preventive obstetrics, maternal and child health and social and preventive medicine to give a comprehensive health care service to the mothers and children. The Institute laid stress on the importance of paediatrics and the need for more time, *i. e.* three months for paediatrics teaching. The specialities are not considered so important except Eye and ENT diseases. However, it was suggested that the curriculum should be dynamic and revised in the light of experience.

5. Trends in the World

5.1. Many of the Health Survey and Development Committee's recommendations³ were based on the Royal College of Physicians reports.

5.2. The first World Medical Education Conference that met in London in 1953¹⁴ made great contribution to Undergraduate Medical Education in focussing attention to requirements for entry into medical schools; aims and content of medical curriculum, technique and methods of medical education and the importance of social and preventive medicine, paediatrics, epidemiology, demography, vital statistics, medical genetics, psychiatry, nutrition, environment, etc., in medical studies.

It was suggested that after defining the aims of medical education the aims of curriculum should be considered. It was stated that if the aim of education is to train a basic doctor, it has to be noted that the aim is to produce an intelligent, educated thinking man who has reached a stage of vocational training which will enable him to acquire more readily the necessary additional knowledge for whichever branches of medicine his inclination, potential and opportunities dictate. The end product should have acquired the basic skills, knowledge and critical faculties firmly based on scientific method and a knowledge of normal and abnormal structure and function in man.

In achieving the aim, the curriculum design and teaching play a major part in developing the qualities of mind which are characteristic of an educated man. But the faculty and inherent qualities of student largely contribute in realising the goals *i.e.* the twin aims, education and training. The fragmentation of the old primary teaching curriculum into different subjects or disciplines created vested interest for the teachers and the ends were forgotten in the maze of means. It was, therefore, considered that emphasis should be placed on the whole before the part and re-unite the disintegrated fragments—in a word to make the curriculum comprehensive once again. There is thus need for coordination, joint teaching etc. to make the teaching person centered and not the disease centered. In the pre-clinical year, the comprehensive nature has to be shown to make the rest of the curriculum in the clinical year to follow. Essentially the curriculum and methods of teaching should aim at self-education. Simplification and unification of curriculum have a good educational value and this can be achieved by integrated teaching and joint seminars and multidisciplinary approach.

5.2.2. At the third World Medical Education Conference that was held in India in October, 1966¹, the theme was "Medical Education in the Service of Mankind". The subject was discussed under four topics:

- (1) Social change and scientific advance, their relation to medical education
- (2) Medical Education and National Structure
- (3) Organization of Medical Education to Meet the Changing Needs of Society
- (4) Planning New Programmes in Medical Education

The Conference made recommendations under Seminar Topic 2 (Annexure II). Discussing the factors influencing the development of the medical curriculum, Ramalingaswami commended¹ the WHO Inter-regional Seminar suggestion on the objectives of Medical Education.

- "1. Every doctor should be familiar with all aspects, preventive and curative, of the prevalent health problems of his Country.
2. He should be competent to contribute effectively to their solution.
3. He should be so imbued with the principles of learning and skilled in its methods that he will be able to continue his further education in medicine for the whole of his professional life".

The Conference expressed dissatisfaction with the existing curriculum and opined that there should be basic curriculum throughout the world. It further stressed that dynamism of a curriculum should allow it to be adapted without too much difficulty to the particular local conditions the graduates will be facing when they begin to practise their profession. It also recommended that the study of the various factors (racial,

cultural, religious, social, economic) which influence the environment should be incorporated in the curriculum at the beginning of the course and that preventive medicine should occupy a more important position.

As regards teaching methods, the following recommendations were made:

- (1) Teaching by means of the tutorial method, in a rural or urban district, with a team or with an experienced general practitioner
- (2) Integrated teaching, starting with cell biology, and gradually evolving into the consideration of more complex structures of the human organization
- (3) Case study of the patient in his own environment
- (4) Integration with other fields of University education, so as to bring the physician out of his intellectual ghetto

As for assessment, it was suggested that objective examination methods may be experimented as they are gaining ground slowly but surely

5.3. Contribution of the World Health Organization in the field of Medical Education

5.3.1. The World Health Organisation has made great contribution in the field of medical education. The Expert Committee on Professional and Technical Education of Medical Auxiliary Personnel in its first session in 1950¹⁵ pointed out that the curriculum was unbalanced particularly in terms of the objective of medical education to produce a body of men who can practise diagnosis and prevention, social as well as clinical pathology and psychological medicine. The Committee stated that emphasis in Undergraduate teaching should be on the principles and methods which will enable the student to learn for himself, to think, observe and draw correct conclusions. The necessity for social and preventive aspect in the pre-clinical and clinical phases was stressed.

5.3.2. The Expert Committee in its Second Report¹⁶ found that each country, or region should have adequate medical education facilities to train physicians to serve their needs, that each medical school should assume leadership in the community, that the general practitioner should be the pivotal member of the group of specialities and to achieve this aim the medical schools should take only those whom they could train well, that broad medical education should be built up and that social and preventive medicine should be integrated in all the disciplines. The Committee also pointed out the importance of behavioural sciences and humanities in medical education.

5.3.3. In the Eighth Report¹⁷ the Committee considered the teaching of basic medical sciences in the light of modern medicine. The Committee considered that the training of the teacher was important. In the preliminary education, physics, bi-mathematics, chemistry (physical and organic) and biology were considered essential.

In the pre-clinical and par-aclinical period, biophysics, anatomy, histology, embryology, genetics, physiology, socio-physiology, pharmacology, biochemistry, medical psychology, pathology, and microbiology are essential for medicine. The social and preventive medicine, with emphasis on demography and statistics, ecology, epidemiology etc. should form part of the curriculum. Integrated teaching would be necessary.

5.3.4. The report of the Study Group on Internationally Acceptable Minimum Standards of Medical Education recommended the following curriculum :

(a) General Education should include humanities, chemistry, mathematics, physics and general biology and knowledge of one U.N. language.

(b) The student should have enough comprehension of the structure and behaviour of man in health and disease. The Group emphasised that the educational system should be based on self-education and the principle of learning by experience.

(c) In the pre-clinical period the Group recommended, anatomy, physiology, biochemistry, biophysics, pathophysiology, microbiology, pharmacology.

(d) In the clinical period there may be a transitional period for physical diagnosis etc., after which medicine, surgery, obstetrics and gynaecology, paediatrics, ENT, Eye and forensic medicine should be the subjects.

(e) In the field of Preventive Medicine, which should extend to both pre-clinical and clinical periods, biostatistics, human anthropology, behavioural sciences, epidemiology etc., should be taught.

(f) Methods of teaching: The Group emphasised the need for proper organization of the medical college, the need for proper academic policy for designing of curricula and experiments in medical education.

5.4. Broadly, in the various phases of teaching, the following are the disciplines that should be included:—

Pre-medical :

Physics
Mathematics
Chemistry
Biology
Humanities
Community orientation.
Social sciences (Social Anthropology,
Economics, Political Science)
Biostatistics

Pre-clinical and
Para-clinical:

Anatomy
Physiology
Biochemistry
Psychology
Correlation of basic & clinical sciences

Human ecology
 Demography
 Family Preventive Methods
 Pharmacology
 Pathology
 Psychopathology
 Sociology
 Microbiology
 Immunology
 Virology
 Parasitology
 Family Preventive Medicine
 Introduction to Public Health

Clinical phase:

Internal Medicine and allied specialities
 Surgery
 Obstetrics and Gynaecology, and allied specialities
 Paediatrics
 Nutrition
 Anatomy
 Psychiatry
 Preventive Medicine
 Public Health
 Epidemiology

Internship

5.5. The WHO Expert Committee on Professional and Technical Education in the 15th Report¹³ emphasised the importance of modern educational methods, the teaching and learning process and the instructional methodology, student evaluation and educational sociology in the training of teachers. The Committee also suggested the need for Research in Educational Process and that studies of educational methods, studies in teacher effectiveness, and studies in educational institution should be taken up. The Committee felt that unless teachers are trained, the curriculum reform could not be effected and sustained.

6. Changes required in Medical Education

The curriculum is found to be too traditional in spite of the recommendations of the various Committees, Conferences and the Medical Council. There is need for determining the causes for such a situation if medical education has to make its contribution in meeting the challenge of the times in transforming the society.

The deficiencies in medical education in India appear to be complex and it should be approached on all fronts. Of these, the curriculum and the methods of teaching are the most fundamental (Annexure III).

6.1. In general education of the students selected for medical education, the place of mathematics and behavioural sciences needs emphasis. The 8th Conference of the Indian Association for Advancement of Medical Education,¹⁹ which considered the subject of professional education, felt that:

- (1) The language of instruction should be English, and
- (2) Physical Sciences [Physics, Chemistry (Physical and Organic)]
- (3) Biological Sciences (Botany, Zoology)
- (4) Social Sciences (Psychology, Sociology, Elements of Economics, Anthropology)
- (5) Biomathematics and Elementary Statistics

are necessary.

Wherever knowledge of these is deficient, students should get an opportunity to be exposed to them in the Medical Colleges during the pre-clinical period.

6.2. In the pre-clinical period, the subjects now taught do not include genetics, psychology, social and preventive medicine, demography and population, introduction of the patient, family and community, and growth and development of the child.

6.3. During the clinical period, pathophysiology, paediatrics, community medicine, and integration of social and preventive medicine require attention in addition to the present subjects.

6.4. Methods of teaching, therefore, require the introduction of innovations: integrated approach, multidisciplinary methods and laying stress on essentials, helping students to learn for themselves electives, modifying the curriculum to be in consonance with the aims of medical education, and appreciation that the aim of the curriculum is to help the learner to educate himself and develop the necessary skills, knowledge and critical faculties.

6.5. The members of the faculty therefore require to be oriented to the requirements of modern medical education and instructional programme as recommended by the 7th Conference of the Indian Association for Advancement of Medical Education.²⁰

7. To approach curriculum revision, with the intent of bringing about fundamental improvement in the educational process and programme, requires baseline data and a perspective on the educational process which are now available to the faculty members in the Medical Colleges.

There is, therefore, need for Research in Medical Education on different facets on the analogy of the Self-study of Medical Schools in the USA.²¹

1. Medical Students: This has already been taken up by the Indian Council of Medical Research in the Socio-economic Study of the Students.
2. Institutional characteristics regarding the size of the budget, the number of the faculties and instructional facilities (Library, Class Rooms, Hospitals

and Clinics and Health Centres) which constitute the supporting structure of the educational programme.

3. Instructional Programme: In the instructional programme there are four components:

- (a) Educational objectives
- (b) Organization of curriculum with reference to educational principles
- (c) Teaching Methods
- (d) Programmes of student evaluation and examinations

Factors influencing the progress of Medical Education should be studied—Annexure II.

4. Educational outcomes consisting of multiple indicators of student achievement and the impact of the College on the students' career, choice and performance after graduation.

The organization of self-studies in each Medical College in the above would greatly facilitate in producing necessary data for the faculty and the educationists for effecting necessary action to speed up the process of progress.

Conclusions

1. Re-appraisal of the "Traditional" curriculum, which is prevailing, is now necessary for progress that is hampered by several factors which require to be identified.

2. The existing curriculum is not only Traditional but, in some cases, very rigid instead of being dynamic. Methods of teaching and the curriculum, instead of being instruments of educational progress, have become tools of inaction and obstruction to progress in India.

3. Studies in the various facets of the educational processes in Medical Education are considered vital for the future of Medical Education.

4. Teacher Training Programme, to assist the learning process, appears to require immediate action.

5. New disciplines like Biomathematics, Biophysics, Genetics, Social Sciences, Demography and Medical Statistics, Pathophysiology, Immunology, Epidemiology, Ecology, and greater attention to Paediatrics and Preventive Medicine require introduction in the Medical Curriculum. This would be possible only when the available

curricular hours and the prescribed curricular hours are adjusted in such a manner that there is time for self-study and time for critical thinking to be developed. Further if the methods of teaching are improved by multidisciplinary approach, it would lessen the time required for subjects which would enable the introduction of new disciplines. The innovation of introducing core curriculum for facilitating the student to progress at his own pace requires sound base.

(See Annexures I, II, III, IV on
pages 31, 41, 43, 45, respectively)

ANNEXURE I

Professional Education

RECOMMENDATIONS
OF THE
MEDICAL COUNCIL OF INDIA

(Adopted by the Medical Council of India at its Meetings on 22nd to 27th November 1964)

(UNDERGRADUATE MEDICAL CURRICULUM)

I. Admission to the Medical Course

No candidate should be allowed to begin the Medical Curriculum proper until :

(i) He has completed the age of 17 years at the time of admission or will complete this age on 1st October of the year of his admission to the 1st M.B.B.S. Course.

(ii) He has passed:

(a) The Intermediate Examination in the Medical Group of an Indian University which includes a practical test:

or

(b) The Intermediate Examination in Arts or Science of an Indian University with Physics, Chemistry and Biology and which shall include a practical test in these subjects:

or

(c) B.Sc. Examination of an Indian University if Physics, Chemistry and Biology have been taken in the Intermediate Examination with a practical test in these subjects:

NOTE : A student who has passed the B.Sc. Examination with two of the three subjects mentioned above, would be admitted to the Medical Course if he passed the third subject in the Pre-professional Examination:

or

(d) The Intermediate Examination held by the Board of Higher Secondary School and Intermediate Education recognised by Government with Physics, Chemistry and Biology which includes practical test in each of these subjects:

or

01210

2200

MP-130

(e) Any other examination which in scope and standard is found equivalent to the Intermediate Science Examination of an Indian University taking Physics, Chemistry and Biology, including a practical test in each of these subjects :

or

(f) The Pre-Professional Examination (Pre-Medical) after passing either the Higher Secondary School Examination or the Matriculation or an equivalent examination and the Pre-University Examination in Physics, Chemistry, Biology and English.

(iii) And the candidate has passed the above examination with compulsory English.

NOTE : (1) Candidates may be selected by a competitive examination at which 50% of the marks may be awarded for the written part, 30% for the academic examination performance, and 20% for the interview at which credit would be given for physical fitness, aptitude, personality, sports, NCC, etc.

or

An interview only may be conducted by a Board of Five Senior Teachers of the Medical College to which he seeks admission. The Principal shall act as Convener at which credit shall be given to the marks obtained at the last academic qualifying examination.

In a State where there are more than one Medical College, a common Board is recommended on similar lines with all the Principals as members.

(2) Candidates should have obtained not less than 45% marks at any of the University Examination mentioned under 1(ii).

(3) The Pre-medical course may be conducted either at a Medical College or a Science College.

II. The Medical Curriculum

The Council recommends the following:

Period of Study :—

1. That every student shall undergo a period of certified study extending over $4\frac{1}{2}$ academic years from the date of commencement of his study of the subjects comprising the Medical Curriculum to the date of completion of the examination.

2. That the first $1\frac{1}{2}$ years shall be occupied in the study of the Pre-clinical subjects and that no student shall be permitted to study the Clinical group of subjects until he has passed in all the Pre-clinical subjects.
3. That throughout the whole period of study attention of the student shall be directed by his teachers to the importance of the preventive aspects of medicine, and of measures for promotion of positive health.
4. That introduction of medical students in the Out-patient and In-patient Departments of the hospital be encouraged from the very beginning of their medical studies in order to stimulate their intrinsic interest in their responsibilities and widening their outlook as regards the sick.
5. That the number of holidays shall be restricted and the total number of full working days, shall not be less than 250 days in a year. Saturday shall be full working days, and vacations and other holidays suitably adjusted.

The following subjects shall be included in the Curriculum and Examinations :

III. Pre-Clinical Subjects — $1\frac{1}{2}$ Years

(In the teaching of these subjects stress shall be laid on Fundamental and Basic Principles of Sciences. Details shall be avoided).

1. Human Anatomy and Physiology.

These courses shall include :—

- (a) Dissection of the entire body. Emphasis on un-important details be avoided.
- (b) Elements of Human Embryology
- (c) Histology
- (d) The principles of general physiology, including Biochemistry and Biophysics; and in the case of those Universities in which no provision has been made for teaching the subject in the Pre-Medical Course, Organic Chemistry. Amphibian experiments by students be considerably reduced and stress be laid on demonstrations in mammalian and Human Physiology. The student should be encouraged to do practicals in addition to demonstrations.
- (e) Nutrition and dietetics
- (f) Elements of the methods of clinical examination, including the use of the common instruments and the examination of body fluids, with demonstrations on both normal and abnormal living subjects.

(The demonstration of structure/and function in the teaching of Anatomy and Physiology should be done as far as possible on the living human subject, and should include the information obtained from radiology).

2. *Introduction of Statistics*3. *Normal Psychology*4. *Introduction to Social & Preventive Medicine and environmental factors pertaining to health* (See footnote on page 39)

NOTE : There should be vertical and horizontal integration of teaching throughout the course.

IV. *Clinical Subjects—Three Years*

N.B. Throughout the whole period of study, the attention of the student shall be directed by the teachers to the importance of Preventive and Social Aspects of Medicine and emphasis shall be laid on Practical Training, Seminars, Conferences, etc.

1. *Pathology and Microbiology, to include:*

- (a) General and special pathology and morbid anatomy
- (b) Clinical and Chemical pathology
- (c) Microbiology and parasitology
- (d) Immunology

Teaching of Pathology and Microbiology should be for $1\frac{1}{2}$ years. There should be teaching of applied pathology for the rest of the clinical period.

Each student shall be required to have received practical instruction in the conduct of autopsies, including Medico-legal, and to have acted as a Post mortem Clerk in at least ten cases.

2. *Pharmacology, including Pharmaco-therapeutics and Toxicology and study of all drugs in Indian Pharmacopoeia:*

Experimental Pharmacology by demonstrations and practicals by students

3. *Forensic Medicine*—This course shall include instruction in the duties which develop upon practitioners in their relation to the State and on the generally recognised rules of medical ethics.4. *Preventive and Social Medicine* (See footnote on page 39).5. *Medicine, including:*

- (a) A course of systematic instruction in the Principles and Practice of Medicine including Paediatrics.
- (b) A medical clinical clerkship for a period of nine months including Outpatients Department.

- (c) During the period of Medical Ward Clerkship, a period of not less than one month shall be spent as Resident Pupil.
- (d) Lecture-demonstrations, Seminars and Conferences in Clinical Medicine, and attendance on general In-patient and Out-patient practice for at least 3 years which may run concurrently with other clinical subjects.
- (e) Instruction in Therapeutics and Prescribing, including (i) pharmacological therapeutics, (ii) the methods of treatment by vaccines and sera and hormones, (iii) physiotherapy, (iv) dietetics, (v) the principles of nursing, (vi) use of radio-isotopes and electronic therapy, and (vii) indication of surgical therapy.
- (f) Instruction in applied anatomy and physiology throughout the period of clinical studies.

Attendance at each of the following Departments for a period of 15 days during which there shall be not less than six lecture-demonstrations:

- (1) Acute Infectious Diseases
- (2) Tuberculosis
- (3) Psychological Medicine and Psychiatry
- (4) Diseases of Skin and Leprosy
- (5) Radiology and electro-therapeutics, their application to medicine
- (6) Dietetics, nutrition and principles of nursing
- (7) Physiotherapy

(Instructions in these subjects, *i.e.* (1) to (7), shall run concurrently with the Course of Instructions in Medicine).

6. *Surgery, including :*

- (a) A course of systematic instruction in the Principles and Practice of Surgery
- (b) A surgical clerkship for a period of nine months including Out-patient Department
- (c) During the period of surgical ward clerkship, a period of not less than one month should be spent as Resident Pupil
- (d) Lecture-demonstrations, Seminars and Conferences in Clinical Surgery, and attendance on general In-patient and Out-patient practice for at least 3 years which may run concurrently with other clinical subjects
- (e) Practical instruction in Surgical Methods including First Aid
- (f) Instruction in the Administration of Anaesthetics

- (g) A course of Instruction in Operative Surgery
- (h) Instruction in applied anatomy and physiology throughout the period of clinical studies
- (i) Attendance at each of the following Departments for a period of 15 days during which there shall be not less than six lecture-demonstrations:
 - (1) Radiology and electro-therapeutics and their application to surgery
 - (2) Venereal diseases
 - (3) Orthopaedics
 - (4) Dental diseases
 - (5) Surgical diseases of infancy and childhood
 - (6) Anaesthesiology

(Instructions in these subjects, *i.e.* (1) to (6), may run concurrently with the Course of Instructions in Surgery).
- (j) Training in Ophthalmology including refraction and the use of the Ophthalmoscope; with hospital attendance for a period of two months
- (k) Training in ear, nose and throat diseases with hospital attendance for one month.

7. *Midwifery, diseases of women and infants and maternal welfare, including :*

- (a) Courses of systematic instruction in the Principles and Practice of Midwifery, Gynaecology and Infant and Maternal Welfare, including the applied anatomy and physiology of pregnancy and labour.
- (b) Lecture-demonstrations in Clinical Midwifery, Gynaecology, and Infant and Maternal Welfare, and attendance on the practice of maternity hospital or the maternity wards of a general hospital including (a) antenatal care, and (b) the management of the puerperium, and on in-patient and out-patient and gynaecological practice for a period of at least six months.
 This period should be devoted exclusively to instruction in these subjects, and should be subsequent to the medical clerkship [Section 5(b)], and the surgical clerkship [Section 6(b)]. Not less than two-thirds of the hours of clinical instruction shall be given to midwifery, including antenatal care and infant and maternal welfare.
- (c) Of this period of clinical instruction, not less than one month shall be spent as a resident pupil either in a maternity hospital or in a hostel attached to a maternity hospital or to the maternity wards of a general hospital.

During this period, the student shall conduct at least twenty cases of labour under adequate supervision.

A certificate showing the number of cases of labour attended by the students in the maternity hospital and in the patients homes, respectively, should be signed by a responsible Medical Officer on the staff of the hospital and should state:

- (i) That the student has personally conducted each case during the course of labour, making the necessary abdominal and other examinations under the supervision of the certifying officer who should describe his official position.
- (ii) That satisfactory written histories of the cases conducted, including, when possible, ante-natal and post-natal observations, were presented by the student and initialled by the supervising officer.

8. Paediatrics

A clinical clerkship for not less than three months, out of which one month may be in the Children's Ward in the Department of Medicine; one month in the Children's Ward in the Department of Surgery and one month in the Infants Ward in the Department of Obstetrics. This training will form part of clinical clerkships in the Departments of Medicine, Surgery and Obstetrics and will be done within the period already allotted for the same.

NOTE : (1) The total number of teaching beds in a hospital may be distributed as follows:

One-third for Medicine

One-third for Surgery

One third for specialities including Obstetrics and Gynaecology.
(More beds should be allotted to Obstetrics and Gynaecology).

V. Professional Examinations

Examinations are to be conducted with a view to ascertain the candidates' knowledge in fundamental and basic principles of the subject. Examination of details should be scrupulously avoided.

At least two University Examinations shall be held antecedent to the Final Examination.

- (i) First Professional Examination after $1\frac{1}{2}$ years of study in,
(a) Anatomy, (b) Physiology including Bio-Chemistry.

Pass Marks : 50% in Written and Oral together.
50% in Practical.

- (ii) Second Professional Examination : After $1\frac{1}{2}$ academic years subsequent to First Professional Examination in (a) Pathology and Microbiology, (b) Pharmacology including Pharmaco-therapeutics and Toxicology, (c) Forensic Medicine.

- (iii) Third Professional or Final Examination : Three academic years after the 1st Professional Examination, provided the candidate has passed the 2nd Professional Examination:

In (a) Medicine including Preventive & Social Medicine and Therapeutics, (b) Surgery including E.N.T. and Ophthalmology, and (c) Midwifery and Gynaecology. Examination in related applied pathology is obligatory.

Pass Marks—50% written and oral together:

50% clinical and practicals, provided the candidate secures
50% of the marks allotted to the clinical part of the subject.

NOTE.—The College may conduct separate examinations in E.N.T., Ophthalmology, Preventive and Social Medicine and Paediatrics and marks obtained at these examinations be given due credit at the final M.B.B.S. Examination.

Periodical examination results should be taken into account at all University examinations. The question of number of periodical examinations be left to the Universities for consideration. The Universities should ask examiners to allot for certified work done in classes, as assessed by teachers and certified by principals, not less than 25% of the marks allotted to practical or clinical test as the case may be, and also 25% in theory from the assessment of sessional theoretical examination.

There should be vertical and horizontal integration of teaching throughout the course.

The above are the broad principles the Council lays down. The details are left to the Universities. These are the minimum recommendations of the Council. Within the broad principles enumerated above, experiments in Medical Education may be encouraged.

Additional items to be included as Footnotes in the Undergraduate Medical Curriculum:

1. Teaching should be re-oriented to encourage observations, deductions and self-study by the students themselves to create an enquiring mind; stereotype teaching and spoon-feeding aimed at cramming facts should be discouraged.
2. During the pre-clinical period the students should be adequately exposed to cases in the In-patient and Out-patient Departments of the hospital to enable them to appreciate applied aspects of basic medical sciences.
3. The students will be imparted instructions on elementary principles of psychology, genetics, statistics and concepts of nuclear medicine and associated hazards (including Radio-active Isotopes and their use). They will also study Biophysics, Electronics, Space Medicine and Concepts of Molecular Biology, etc.
4. Special emphasis should be laid on:
 - (a) Family Planning and the measures adopted to check the population and
 - (b) Study of Health and National Plans.

5. Students should participate compulsorily in Seminars, Conferences, Symposia and Clinical/Pathological Conferences from the early days of their medical studies.
6. During their period of study they should be made to take interest in research projects and on problems of investigations and submit a review which may be given due credit at the final examination.

Through the courses of training, due attention of the student be drawn to :

1. Self Education
2. Regular work in the hospital
3. Community Medicine
4. Psychology
5. Bio-Statistics
6. Principles of Genetics, Bio-Medical Electronics, Radiation Therapy, Nuclear Medicine and Space Medicine
7. Family Planning and some knowledge of National Health Plan
8. Initiation into Methodology of Research
9. Elective Subjects

FOOT NOTE :

Social and Preventive Medicine

The curriculum comprises the courses as outlined in Appendix 'A' for Social and Preventive Medicine which gives the year-to-year work from the beginning of the student's course. The Universities can either have a separate paper in Social and Preventive Medicine alongwith Medicine, or they can have a separate examination in Social and Preventive Medicine.

The curriculum detailed above, including Social and Preventive Medicine, should be adopted in full in all colleges with immediate effect and report sent to the Council regarding the implementation of the same.

Pre-Registration Training/Internship (Recommendations adopted by the Medical Council of India on 20th/21st June, 1965):

(These Rules will be applicable to the students joining the Medical Course from 1966 onwards)

1. Every candidate will be required after passing the final M.B.B.S. examination to undergo compulsory rotatory internship to the satisfaction of the University for a period of 12 months so as to be eligible for award of the degree of M.B.B.S. and full registration.
2. The University shall issue a provisional M.B.B.S. pass certificate on passing the final examination.
3. The State Medical Council will grant provisional registration to the candidate on production of the provisional M.B.B.S. pass certificate and also an order from the Principal or Director of Health/Medical Services showing that the candidate has been selected for training. The provisional registration shall be for a period of one year. In the event of shortage or unsatisfactory work, the period of provisional registration and the compulsory rotating internship may be suitably extended by the appropriate authorities.
4. The Interns shall be entrusted with clinical responsibilities during the period of internship and shall maintain a record of work which is to be verified and certified by a medical officer under whom he works.
5. On the successful completion of Pre-registration Training, as certified by the Principal on the recommendation of the authorities under whom the training was done, the University shall award the M.B.B.S. degree or declare him eligible for it.
6. Full registration shall only be given by the State Medical Council on the award of the M.B.B.S. degree by the University or the declaration that the candidate is eligible for M.B.B.S. degree.
7. The period of compulsory rotating internship for 12 months may be done in an approved hospital and shall include training for 3 months each in Medicine, Surgery and Public Health work in a rural area, and for 3 months in Obstetrics and Gynaecology a part of which can be spent in any other elective clinical subject.
8. One year's approved service in the Armed Forces Medical Services, after passing the final M.B.B.S. examination, shall be equivalent to the Pre-registration Training detailed above.
9. The Interns should be given due remuneration and free accommodation by the authorities concerned.

NOTE:—Instructions issued by the Medical Council of India from time to time from 1962 to 1965 regarding compulsory rotating internship/housemanship will be observed in all the Institutions in regard to admissions made up to 1965 when the above rules become operative *in toto*.

ANNEXURE II

3rd World Medical Education Conference, held in India in 1966.

Seminar Topic 2. MEDICAL EDUCATION AND THE NATIONAL STRUCTURE

Recommendations

Following consideration of these points, the Seminar participants made the following recommendations:

1. That a careful study be made of national medical and health programs and their organization, and that a coordinated system of rural health and hospital centres under the direction of an efficient and not too costly team of doctors, nurses, and auxiliary personnel, be established.

2. That to encourage professionals to remain in rural zones, a study be made of certain motivating factors such as (a) better economic conditions, (b) adequate working resources, (c) satisfactory living conditions, (d) the help of medical and health auxiliaries, (e) the opportunity to take refresher courses and to continue their education, (f) the initial phase of an adequate health programme, either national or regional, and (g) the creation of schools of medicine in small or medium sized cities located in agricultural regions.

3. That it is necessary to devise regional and national health projects that will take into consideration the unique characteristics of each region and country.

4. That in order to develop these projects adequately, it is necessary first to make certain studies and scientific investigations that will measure objectively local needs and health resources bearing in mind not only the calculated needs but also the effective demand. The term "effective demand" is defined as "those health needs recognized by individuals and governments, the financial cost of which they are willing to underwrite". These studies should include areas such as (a) a census of morbidity and mortality, (b) an analysis of human health resources, (c) a study of the institutional resources such as hospitals, health centres, and schools of medicine, dentistry, and nursing, (d) an analysis of the socio-economic and cultural aspects that are closely related to health protection and medical care.

5. That health personnel and medical educators should prepare regional and national health plans of short or medium range based on these studies, bearing in mind, however, that what is important is not the devising of these plans but their being progressively put into effect.

6. That in preparing these health plans, it is advisable to consult other professionals such as economists, sociologists, anthropologists, and specialists in public

administration, who are skilled in methods of planning. It is also advisable that doctors be given the opportunity to improve their knowledge in the sciences mentioned above.

7. That health planning forms part of national programmes of development. It should be remembered that these activities are reciprocally related with regard to the process of planning and that doctors should therefore be willing to take an active part in the analysis and elaboration of programmes in other phases of national planning such as agriculture, education, housing, and nutrition.

8. That the programme of studies for the new schools of medicine or of nursing and the changes in curriculum of those now in operation should be based on the findings and results of the national health programme.

9. That good health planning requires the adequate devising of experimental programmes based on careful observations of the area involved. It is of utmost importance to evaluate objectively the results of new systems (operations research) which are more efficient in health care. It is likewise necessary to measure the cost-effect ratio of these systems.

10. That in view of the complexity of the methods suggested and the large number of variables involved, it is necessary to make use of computers. Scientists of the countries that are more developed could play an important role in structuring models for utilizing these methods.

*ANNEXURE III***DYNAMICS OF CURRICULUM**

The word 'Curriculum' is derived from Latin 'curriculum' which means a course, a race chariot, indicating that it is a moving or dynamic phenomena:

Curriculum encompasses the following :

1. A prescribed systematic group of courses or sequence of subjects required for graduation in a major field of study.
2. A general overall plan of the content or specific materials of instruction in subjects.
3. A body of prescribed educative experiences under supervision to provide the student with the best possible training and experience to fit him or her for the society of which he or she is a part.
4. A sampling of a whole body of knowledge which the student should master plus the development of habits of accurate observation, logical thinking, intellectual and vocational skills.

Planning and organizing the Curriculum

A curriculum is seldom drawn by a single individual. The whole faculty has to participate within the total frame work of the University, and the Medical Council recommends that participation of the students may sometimes be welcomed. 7

Study Group should be set up for :

1. Philosophy of the College in line with the educational objectives
2. A structural analysis of the Community
3. The problems of students and the College and of learning and of study
4. Community resources, library, etc.

Courses should include

1. Detailed descriptive courses
2. Source book courses
3. Problem discussion courses
4. Clinical courses

Content of the courses should include

1. Topical plan which lists the Topics for study
2. Subject Plan
3. Problem Plan

Types of Curricula

1. *Core curriculum* : This may be regarded in a number of ways, (a) as a group course for all students, (b) as a group of correlated courses, (c) as an organization of subjects matter to cut across the traditional subject matter lines through co-operative planning.

Dr. Harvey D. Strassman *et al.* (1969) describe a new concept for a core medical curriculum (*Jour. Med. Education*, March 1969, Vol. 44, No. 3, Pages 170-177) :

“A new curriculum organization is presented in 2 phases. Phase I is organised on the basis of signs and symptoms. Phase II consists of a series of clerkships in which the student is a junior colleague; and Phase III provides in depth clinical experience. The programme utilizes the optional educational environment in which the emphasis is on self-learning with adequate guidance by the faculty. As the student achieves proficiency, he is given commensurate responsibility; learning takes place in real life situations and is continually supported by correlated laboratory and basic science information. The student learns at his own speed; advancement does not depend on how much time is spent but on demonstrating learning by the student”.

2. *Subject matter curriculum* : It is a systematic sequence of courses or subjects required for graduation (This is time-consuming, duplication is the rule).

3. *Integrated curriculum* is one in which the subject matter boundaries are ignored, all teaching is in relation to broad areas of study and in relation to one another; cell, tissue, organ, system and so on.

4. *Broad fields curriculum* is one built around a small number of major areas of study that are constant for all students.

Curriculum appraisal

One of the important aspects of curriculum development is appraising the value and extent of learning for the purpose of improving it. This appraisal involves the evaluation of all learning outcomes, resulting from teaching. It weighs the objectives or goals of a course, unit or lesson and as such forms an integral part of teaching.

Educational objectives

(a) Broad philosophical statements intended to indicate the general manner in which the medical college is fulfilling its obligations to the profession, to science and to society.

(b) Statements of defined disciplinary content.

(c) Specific statements of knowledge, skills and attitudes which students are expected to acquire as a result of educational programme.

ANNEXURE IV**Factors Influencing a Program of Medical Education**

Nature of student	Learning process	Facilities Materials Techniques	Curricular approach	Subjects approach	Broad fields approach
Health needs of Society				Emerging needs approach	
Philosophy of scientific thinking	Objectives 1. Overall 2. Departmental 3. Specific		Curricular experiences for Medical Students (Includes Subject Matter)		
Professional characteristics of Physicians			Basic SciencesDept.Dept.Dept.	Clinical SciencesDept.Dept.Dept.	

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Need to give new look to the educational methodology: Re-orientation of medical curriculum towards self-education*

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MEDICAL education is dynamic and the existing teaching programmes in most of our institutions have not met this challenge of dynamicity of medicine with consequent rapidly expanding knowledge. It is widely accepted by medical educationists that changes in the traditional medical curriculum are desirable and indeed necessary. Unfortunately, all attempted reforms have been piecemeal and half-hearted, having only succeeded in adding more to the already over-burdened curriculum. What is needed is a complete "new look" for medical education to fulfil its goal of enabling the student to acquire medical knowledge and to develop attitudes which enable him to see his patient as a whole, to be able to serve the community as well as the individual, and to effectively serve a society which is predominantly rural, but is rapidly changing. The existing curriculum should thus be geared to the changing needs of our society.

To achieve these objectives our educational methodology has to be completely overhauled and the present system of teaching replaced by techniques of self-education. To achieve desired results, it would obviously depend upon a number of variables, e.g. teachers own capabilities, teacher-student ratio, educational methodology and methods of evaluation. Herein lies the importance of research in educational methodology of teaching and evaluation of progress, which to my mind, should form an integral activity of any medical faculty.

The present medical curriculum of set lectures and demonstrations, mostly involving didactic teaching, should be replaced by techniques encouraging self-education, e.g. small group projects, conferences, seminars, tutorials etc. in which the students are major participants. Integrated teaching or introduction of correlated teaching

*Paper presented at the Meeting of the Ad Hoc Group on Medical Education, convened by the Indian Council of Medical Research, New Delhi, held at Madras on 10th and 11th October, 1969.

programme in the medical curriculum, as has been introduced in some faculties, should be widely encouraged. This will not only help in shortening the syllabus but also help in producing a doctor capable of viewing the patient as a whole.

It is felt, and rightly so, that too many details are taught and too much time is allotted to pre-clinical courses like Anatomy and Physiology, *e.g.* 1124 hours out of a total period of 4158 hours in some medical colleges. The transition from pre-clinical to clinical is abrupt. The applied aspects of Anatomy and Physiology are insufficiently taught and atmosphere of research is lacking in most of the institutions.

Regarding para-clinical and clinical teaching it is generally agreed that the education is too much theoretical and that due to lack of proper integration between pre-clinical, para-clinical and clinical subjects, too much futile repetition is envisaged. Teaching of preventive and social medicine is not adequate. Its teaching should be integrated throughout the medical curriculum. The old established clinically-orientated pattern should be changed to field training in Block Hospitals and Rural Health Centres. This programme should further continue during a couple of months of internship year, which would further enhance its value. The purpose of such a programme is to introduce the students in the clinical years to the practice of comprehensive medicine and expose them to rural society which he may be required to serve after graduation.

Newer disciplines like medical statistics, humanities, psychiatry, psychological medicine and human genetics should be introduced in the curriculum more liberally and at an earlier stage. The problems involving a population pyramid of a developing country like ours, having a large number of young people and relatively smaller number of old people, stress the need for a more concentrated effort on the teaching of Paediatrics in our medical curriculum as compared to Genatics. Preventive paediatrics and child nutrition are important components of the training and service programme.

The provision of elective time in the curriculum of a medical student, which is really the time spent by the student on self-education, is designed to encourage the student to vary his course of study according to his special interest and particular dealings, as far as concerned with the requirements stipulated by the University, Indian Medical Council, etc. His particular interest and abilities might receive impetus and he would be free from the formal class-room atmosphere. He would get a chance to experiment with his own abilities and find out his failings.

An obvious advantage of this elective time programme could be to increase the research potential of the country. As a part of elective training programme, a medical student should be provided with opportunities to perform experiments as a part of his curriculum, not only to emphasize the dynamic concept of disease but also to get the opportunity to test his aptitude and choose research as a career later in his life.

Another training procedure which has been successfully adopted is the introduction of experimental methods whereby a student learns a disease process by performing

experiments as part of the curriculum. This helps to educate the student in scientific methods of thought and inculcate in him curiosity and initiation. An experimental programme in pathology is now an essential procedure of the medical education. It is hoped that introduction of such a course in experimental pathology for under-graduate students would provide an integration of teaching and research. It would also transfuse the spirit of initiation, diligence and scientific curiosity in the young minds.

Pathology course has strategic position in the curriculum. It forms a link between normal structure and function on one hand and disturbed structure and functions on the other. It, therefore, comprises the study of pathological anatomy, pathological physiology and pathogenesis of disease process and translation of this knowledge to clinical medicine. Pathology, being an inter-departmental teaching discipline, is thus best suited for the training programme of experimental medicine.

With the above objectives in view, a course in Experimental Pathology has been introduced in the under-graduate pathology curriculum at the S.N. Medical College, Agra since 1960. The course is conducted as follows:

A series of 20 experiments have been selected. 10 experiments are done in the 3rd year and the remaining 10 in 4th year. The whole class is divided into 10 groups. Each group performs one experiment and the results presented at a conference to the entire class, so that all the students become familiar with the complete series of the experiments. The conference permits critical discussion of the results and also includes introduction of original literature and historical aspects of the subject. The discussion in the conference particularly emphasizes the importance of the changes found in the animal experiments and their application, if any, to human disease process.

The experiments are presented essentially as a "separate course", but an effort is made to carry these out concurrently with the regular teaching programme of the various systems in pathology. This, thus, constitutes an integral part of the teaching of Pathology and Microbiology course. Such a study is mainly directed towards the understanding of certain basic concepts, the mechanisms of disease, critical appraisal of observations and a training of self-education.

Occasionally if an experimental technique is too time-consuming, it is presented as a demonstration to the whole class in groups.

The following series of experiments are being conducted by the students during the year 1969:

(1) Injection techniques:

- (a) Intravenous injection in rabbit and rat.
- (b) Sub-cutaneous inoculation in guinea-pigs.

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- (c) Intraperitoneal inoculation in mouse and guinea-pigs.
- (d) Intracardiac puncture in guinea-pigs.
- (2) Verification of Koch's postulates.
- (3) Study of experimental anaphylaxis.
- (4) To study the antibody response of parental inoculation of bacterial antigen in rabbits.
- (5) Experimental epidemiology of infection.
- (6) Experimental production of gangrene.
- (7) Experimental production of thrombosis.
- (8) Study of the vascular changes due to the action of chemical irritant on tissue.
- (9) Study of experimental embolism.
- (10) Arthus, phenomenon.
- (11) Identification of haemoglobin types by alkali denaturation and paper electrophoresis.
- (12) To study the primary and secondary immunological response to injection of salmonella antigen.
- (13) Induction of anaemia in guinea-pigs by repeated blood letting.
- (14) Study of acute carbon tetrachloride injury in rat liver.
- (15) Pulmonary alterations in mice exposed to low barometric pressure (simulating high altitude).
- (16) Study of pulmonary oedema in experimental animals.
- (17) Effects of ligation of common bile duct.
- (18) Study of physiological compensatory hypertrophy of kidney after unilateral nephrectomy.
- (19) Study of the effects of experimental bacteraemia in rats.
- (20) Study of the immunological effects of repeated injection of an antigen into animals.

Training of undergraduates in experimental techniques helps to emphasize on the methods and habits of learning by the student, against the teaching by the staff based on set curriculum which is hardly true education.

Examination methods : Newer techniques and principles of construction and evaluation of different examination methods

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Introduction

HUMAN being as a biological entity is a highly complex amalgam of physical, intellectual and behaviouristic traits. While physical characteristics may be measured and expressed as vital statistics, no such universally acceptable criteria or units of measurement are available for the complex intellectual and behaviouristic traits of man. This difficulty is particularly applicable to measuring the competence of a physician. Besides, the criteria of competence of a physician applicable to one society may not necessarily be so in another. As Katz has emphasized "no test can be prescribed as best for all schools but there are fundamental purposes and procedures for test selection that can be recommended to all". A similar recommendation has recently been made in a Bulletin published by the World Health Organisation "that the professional responsibilities of the physician have to be defined in the light of the health needs and organisation of health services in each geographic area". To have agreement on universally acceptable yardsticks of measurement of competence of a physician is difficult enough; it is still more difficult to assess the efficacy of different types of examination, in other words to examine the examination.

In recent years, in many countries including ours, there has been increasing realisation that our educational methods in teaching of medicine should improve. While there may have been introduction of the required curricular reforms and emphasis on the acquisition of pedagogic skills and introduction of newer methods of teaching, we have often bemoaned the antiquity of our examination systems which continue to be a century old. In this present discussion, I would briefly attempt to review some of the improvements of the conventional methods, and principles of evaluation of the different methods on a comparative and objective basis.

Definition of Goals—What should be measured ?

Before entering into a discussion on the evaluation of utility of different methods, as in any scientific experiment, we need to define what are our goals. What is it that we desire to be measured? As stated earlier, there is no universally accepted prescription, and each society has to find its own, perhaps with varying degrees of emphasis on the curriculum and skills, particularly in the context of curricular requirements, *e.g.*, infectious diseases, diseases of malnutrition, reproductive biology, psychological disorders, clinical research, etc. The requirements for medical competence particularly fall into three main categories (Charvat, McGuire and Parsons, 1968) :

1. Those in the cognitive category (*e.g.*, intelligence, understanding, problem-solving ability).
2. Those in the psychomotor category (*e.g.*, technical skills).
3. Those in the affective domain (*e.g.*, professional attitudes, habits, values, etc.).

In any rational programme anywhere in the world, attention must be paid to the evaluation of each of these critical requirements. They, therefore, form an objective basis for making a check-list by which a student's performance in any type of examination method could be measured. A detailed list of qualities and performance requirements, under each of these categories, is given in Annexure I.

It may be mentioned that studies conducted even in countries which have introduced examination reforms have revealed very little correlation between these three essential requirements of physician performance. For example, in the objective tests administered in the examinations in the U.S.A. and Canada, a disproportionately large number of questions focus only on the cognitive domain and that too on a simple recall of information. A recent study, conducted at the University of Illinois, has revealed very poor correlation between scores on sets of questions designed to measure recall of information with those designed for interpretation of data or problem solving.

The "Process Approach" to determine what a test measures

Using the above specified qualities, under the cognitive, psychomotor and affective domains, each question/exercise of the examination is categorised after an introspective evaluation of the type of intellectual process involved in solving it. In this manner, we can have an objective opinion regarding the intellectual quality or skill that the examination is emphasizing.

Construction of Tests

It is not the purpose of this presentation to discuss the principles of construction,

particularly of the objective type examinations, which would be repetitive of what we have done in the previous conferences on the subject. I would like to mention briefly the principles evolved recently in improving or imparting objectivity to the conventional examination methods and further emphasize on the limitations of the different types of item formats used in the multiple choice examination, as applicable to the objective assessment in respect of the three categories of physician competence stated above.

It is universally agreed that our examination methods must have three minimum essential requirement, *i.e.*, objectivity, validity and reliability. In this connection, it may be relevant to refer to Olsen's "continuum" on the spectrum of the parameters which are measured by different types of examinations in varying degrees (Annexure II). One end of the spectrum is represented by analysis and the opposite by synthesis. The multiple choice tests, most of which test knowledge, recall of information, interpretation and a limited amount of problem-solving, are nearer the analysis end of the spectrum. These are reliable, in the sense that they yield scores which are reproducible irrespective of who evaluates the papers. Most of these do not test the more complex behavioural traits which constitute the total competence of the physician, and are therefore not valid as applicable to practical, close-to-life situations.

On the other hand, the essay type examinations permit the candidate to organise, integrate and express herself/himself in a realistic manner, and therefore sample his qualities of synthesis of the total information that he possesses. This type of test is closer to the synthesis end of the spectrum and considered more valid, though it is not reliable owing to lack of objectivity of scales of measurement.

In other words, none of these two types of examinations possesses even the features which would truly evaluate the total competence of a physician. According to Olsen, a careful planning of the structure of the oral examination perhaps encompasses the maximum area of this spectrum, by sampling a range of analytical or synthetical qualities. It is thus evident that none of the examination methods, recently developed or the conventional one, provides a panacea which would effectively measure physician competence. It seems that a rational combination of multiple choice, the essay, oral and practical tests perhaps will have a very comprehensive coverage of the three categories of qualities outlined above. However, in each of these types of examinations, the following improvements have been suggested :

(a) *Objective Tests* : The types of objective tests employed in most institutions chiefly emphasize the quality of simple recall of information, consisting of isolated facets which, although related to the theme, may not provide similarity with situations as occur in actual practice. In other words, most of them lack the quality of problem-solving. However, another item type format in this system, if judiciously framed, can counter the objection. In this type of item, a case history or a set of laboratory or

X-ray findings or a combination of experimental data may be provided as the stem on which a range of questions can be addressed including interpretation of the findings, application of the findings in the management of the case or interpretation of results for further extension of the experiment, etc. Thus a variety of test situations can be created in which the student skill at synthesizing a set of data, making a meaningful interpretation and applying them to actual situations that he is likely to encounter in practice, can be created.

(b) *Simulation Technique* : These tests have recently been developed which are designed to measure a student's judgement in solving realistic problems involving sequential analysis. The candidate is provided a brief clinical history of the patient or a short colour film or a high fidelity recording of the heart sounds, etc. The examinee has to take decisions regarding his initial approach to the patient and record his decisions by erasing an opaque overlay of a specially constructed answer sheet. One erasure confronts him with a list of possible courses of action which yield further information about the patient. He then proceeds with further erasures at appropriate places, depending upon the judgement of the next sequential step. Thus his total knowledge on the topic and a practical approach to the patient are simultaneously evaluated.

Refined as this technique is, it seems impractical in our own circumstances owing to the expertise involved in producing such a type of question paper on an economic basis.

(c) *Essay Examination* : As stated earlier, despite the numerous drawbacks that this conventional method has, chiefly the lack of objectivity by which a number of answers can be evaluated, it still has a place in the examination system since in Olsen's "continuum", the essay test approaches validity and synthetic judgement, more than the newly developed multiple choice type questions. The lack of objectivity can to some extent at least be mitigated by (a) framing the questions more precisely, clearly defining the responses that are expected, (b) having previous agreement and planning on the total amount of information which is expected, also stating the minimum which is necessary for giving a successful grade, (c) designing a check-list for each such question which may be filled out by the examiner after the question is read, (d) assigning grades of evaluation based on predetermined scales according to the responses entered in the check-list.

(d) *Oral Examination* : A carefully designed and planned oral examination covers the widest range in Olsen's "continuum" which means that it covers a wide area of reliability and validity, evaluating both the analytical and synthetical qualities of competence. Again, the principle is to select the object of oral examination and frame a range of questions together with agreed responses to each of the questions asked. The object may consist of a specimen, an X-ray film, an electro-cardiographic tracing or even a written problem which the student is given a few minutes to study. Thereafter, the student's responses are entered in a prepared check-list, pinpointing his omissions, or his positive responses.

Often the examiner himself may act the part of the patient by giving his presenting symptoms and then allowing the student to proceed with the investigation of the case. The student may be asked to perform certain investigations or he may be provided with the results of investigations which he may ask for. The examiner may lead him to the point that is desired. In this manner again, the student's total approach to the patient is examined. A modification of this is what is called a "a structured oral". Generally this exercise is used for the clinical subjects only. A case is given to the student for working up:- eliciting the clinical history, doing a physical examination and doing simple laboratory tests. He may ask for some other investigations the results of which are provided. The student is then questioned on the differential diagnosis, methods of management, etc. For each of the categories of skills required in working up the case, scores are given on a prepared check-list, according to a uniformly and pre-agreed policy. This, therefore, makes the combination of cognitive as well as psychomotor skills.

(e) *Practical Examination* : The design of a practical examination may be made as close to real life situations as possible. He may be asked to carry practical exercises while he is watched by the examiner. His techniques as well as his results may then be recorded objectively on a prepared check-list.

It has thus been recommended that even the conventional essay, oral and practical examination, if properly planned, may be made objective. The data obtained may have greater validity as well as reliability than the conventional methods so far used.

Behavioural Tests

This part of the physician competence, which represents the ultimate mixture of his knowledge, technical skills and psychological make up, is the one which yields with greatest difficulty to objective analysis. It is also not possible to comment on these qualities in a single or even an occasional encounter with the students in a formal examination. This can only be done by teachers who are in constant, prolonged contact with the student, as he works around the wards with the patients. Again, instead of a comment being made on an overall impression of the teacher, a prepared check-list regarding each behaviouristic trait, *i.e.*, attitude to the patient, reaction in an emergency, reaction to criticism, ethical qualities, etc., as indicated in the Annexure, may be filled in for each student at the clinical posting or at the end of each phase of his training.

This is just a summary of some of the newer trends which have been attempted for introducing a greater degree of rationality and validity into our conventional methods and further refine the interpretation of multiple choice tests.

Evaluation of the Different Methods of Examination

This in fact means examining the examination. It is not difficult to define the methods of testing once there is a general agreement on the attributes or the qualities

which are desired to be evaluated by each method. However, it is difficult to decide which method of examination is superior, when it comes to its applicability to the total finished product. What constitutes a model doctor, is a question which is debatable even in a given geographic area. If the examinations are designed eventually to promote better training of a physician who is better suited to serve in his own milieu, then there has to be a consensus on what kind of a doctor is aimed at being created. The success of a physician cannot be directly correlated with the examination scores. Even if such a correlation is attempted, does it indicate that his quality has been improved because of a better examination method. The answer is extremely difficult because a certified physician is a finished product of many variables including his early education, his background, training received, the milieu in which he was trained, the examinations and a set of other complex factors.

However, a correlative and comparative study of the examination methods can be planned on the following lines:

1. Is the given examination method reliable and/or valid?

Generalizations can be made as discussed above regarding the merit of each type of testing, *e.g.*, Multiple choice, Essay, Practical, Clinical or Oral tests. A more specific evaluation of the examinations as administered in our universities can be made by preparing a check-list or a questionnaire, in which the various parameters pertaining to these features can be filled out for the different types of tests in the examinations, and then statistically analysed.

2. What among the three essential attributes and skills, *i.e.* cognitive, psychomotor and affective, does each examination focus upon, and to what degree? Again a questionnaire or check-list can be prepared on the lines of the Annexure which may be filled out for each type of test and then statistically analysed.

3. How does the examination scores reflect the eventual success of the physician? This is perhaps the most difficult among the various parameters of evaluation, and needs a very long longitudinal follow-up. Presuming that the analytical data as per (2) above on the cognitive, psychomotor and affective skills are available, it may then be studied to what extent does the "success", if this can be defined and measured, of a physician in his practice, correlate with each or the total summation of the above qualities. The design of studies on each of the above lines needs an expertise of educationists, psychologists and statisticians.

ANNEXURE I

**An illustrative list of critical performance-requirements
for physicians**

(A) Cognitive domain :

1. Knowledge of fundamental technical vocabulary, facts, concepts, principles, laws, methods, and procedures as demonstrated by :
 - (a) accurate recall;
 - (b) accurate recognition.
2. Understanding of these facts, concepts, etc., as demonstrated by the ability to :
 - (a) explain them;
 - (b) recognize their implications;
 - (c) use them for the explanation of phenomena.
3. Ability to analyse and interpret data of various types as demonstrated by :
 - (a) accurate translation from one form to another;
 - (b) formulation of plausible hypotheses to explain data;
 - (c) recognition of limitations of data;
 - (d) formulation of plausible predictions.
4. Ability to solve relevant problems, as demonstrated by :
 - (a) recognition of the data required to solve the problem;
 - (b) utilization of appropriate sources to obtain the required data (e.g., selecting or ordering appropriate X-ray photographs or laboratory tests);
 - (c) formulation of a tentative hypothesis (or diagnosis);
 - (d) recognition of appropriate methods for checking the hypothesis (or diagnosis);
 - (d) formulation of a plausible scheme of therapy.

5. Ability to take a history, as demonstrated by :

- (a) eliciting the chief complaint;
- (b) obtaining a clear description of the present illness;
- (c) following-up positive leads in the history;
- (d) obtaining adequate information about past illnesses and family history;
- (e) obtaining adequate information about each system;
- (f) using vocabulary and form of enquiry appropriate to the patient's comprehension and co-operation.

6. Ability to retrieve information and to keep records.

7. Ability to utilize community resources.

8. Judgement in evaluating a complex situation, such as research, laboratory, clinical or community problems, when for example :

(a) Dealing with complicated clinical cases by :

- (i) recognition of the urgency or seriousness of the situation;
- (ii) adjustment of the nature of the history-taking and physical examination to the requirements of the specific situation;
- (iii) recognition of the need for special additional diagnostic methods, such as repeated X-ray examinations or laboratory determinations, and interpretation of these findings.

(b) Establishing a correct diagnosis in complicated cases by :

- (i) double-checking of the unexpected finding;
- (ii) persisting till a definitive diagnosis has been established;
- (iii) recognition of the primary disorder;
- (iv) recognition of underlying or associated problems;
- (v) adequate care to rule out other disorders, etc.

(c) Making the right decisions for ordering appropriate management in complicated cases by :

- (i) determination of the kind, extent and immediacy of needs;
- (ii) planning the patient's management for a given situation;

- (iii) adaptation of treatment plans to the individual patient with the consideration for patient's age, general health, special needs, or a specific condition that may require special attention to therapeutic contra-indications;
- (iv) checking the effectiveness of therapy by monitoring the patient's progress;
- (v) re-assessment and modification of treatment plans in response to changes in patient's condition;
- (vi) arrangements for follow-up and long-term care, including appropriate use of referral services for physical, social and economic rehabilitation.

(B) Psychomotor domain :

1. Skill in performing physical examinations, as demonstrated by :
 - (a) performance of a thorough general examination;
 - (b) accurate detection of all significant physical signs by inspection, percussion, palpation and auscultation;
 - (c) performance of examination without causing the patient undue pain or embarrassment.
2. Skill in using various laboratory and clinical instruments, *e.g.* the microscope or ophthalmoscope.
3. Skill in performing technical procedures, such as venupunctures, lumbar punctures, catheterization, intubation, preparing a specimen, or handling delicate biological materials.

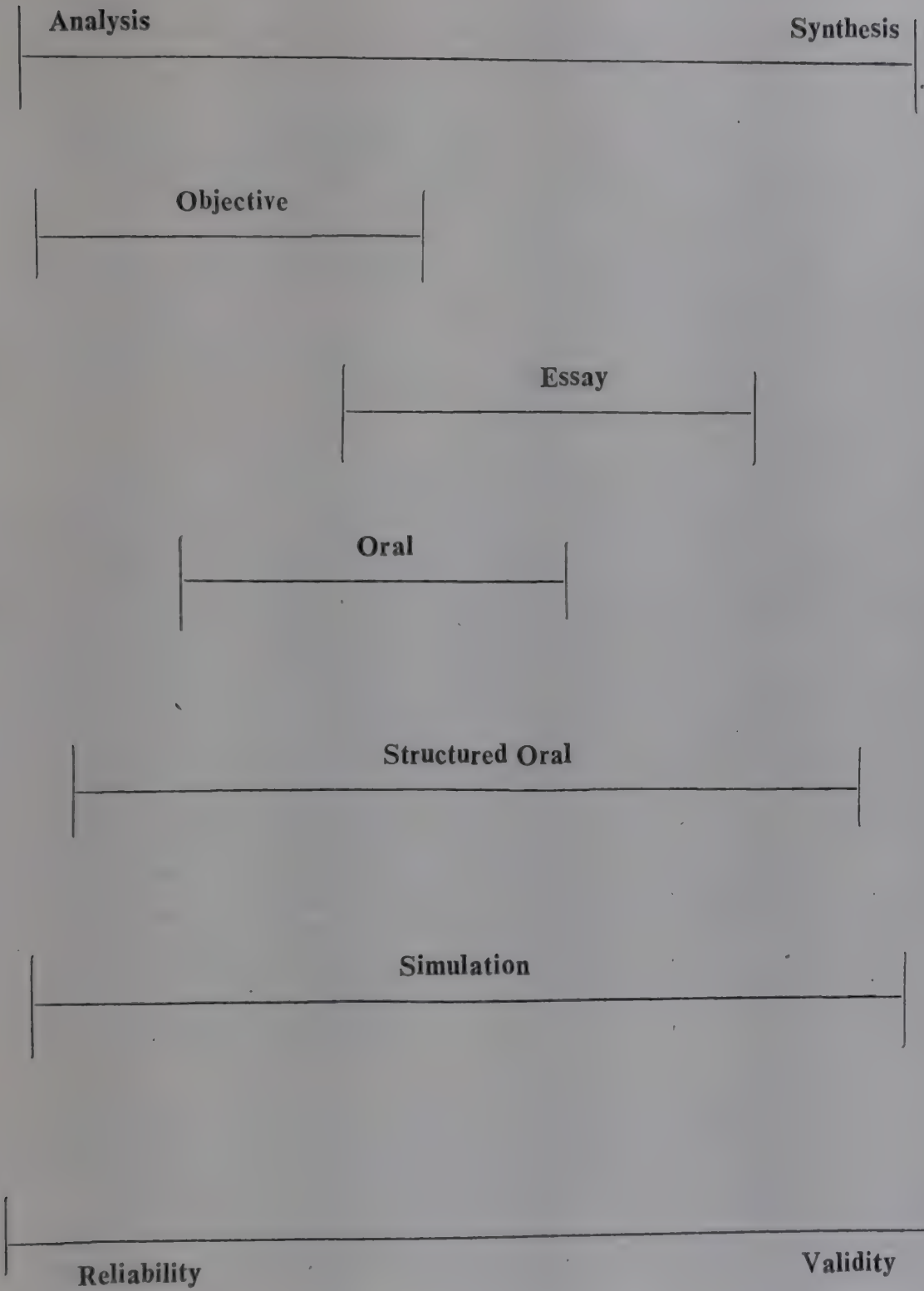
(C) Affective domain :

1. Concern for patient and patient's family, as demonstrated by :
 - (a) a personal interest in, and acceptance of responsibility for the patient's welfare;
 - (b) awareness of the patient's anxiety, which should be allayed by reassurance and support;
 - (c) a discreet and tactful manner when dealing with the patient and his family;
 - (d) frank discussion with the patient and family to explain his condition treatment, prognosis or potential complications.

2. Awareness of his own professional capabilities, and limitations in particular :
 - (a) acts only within his own area of competence, unless forced by an emergency to help in another speciality;
 - (b) admits areas of ignorance and error;
 - (c) seeks help, advice or consultation.
3. Willingness to establish effective relationship with colleagues and other members of the health team, and to :
 - (a) accept suggestions and criticism;
 - (b) handle differences of opinion discreetly and tactfully;
 - (c) give support and direction to less experienced personnel;
 - (d) take responsibility for his own decisions.
4. Willingness to develop and to apply an inquiring mind in order to :
 - (a) reconsider cherished convictions;
 - (b) actively seek new knowledge.
5. Organization and utilization of own specialized knowledge and skills to contribute to community as well as to individual patients, welfare.

The above items (A) and (C) of the Critical Performance Requirements for Physicians, are based on *Taxonomy of Educational Objectives*, Handbooks I and II.

ANNEXURE II



Teachers in a Medical College— Is it desirable to teach them— “How to teach them”

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TEACHING in any college or discipline is both an art and science. During recent times, science has made a phenomenal progress in all fields, including the science of “medical education”. Whereas India has been trying to keep pace with the advanced countries in promoting fundamental and applied research in basic and clinical subjects, we have been left far behind them in making any progress in the science of “Medical Education”. If teaching in medical colleges has to be a progressive science as also a modern art, then the only answer to the question posed above is definitely in the affirmative. Not only is it desirable but essential to teach the teachers of medical colleges if the purpose of medical education is to be fulfilled in the real sense of the term. It is true that some persons are born teachers, possessing an inherent quality of an inspiring teacher. Such gifted persons are few and far between. Even these persons have improved their teaching faculty by experience and training. Teaching would appear to be a fascinating subject. Most of the Post-graduate students give teaching as their first choice for their future career. Why is teaching so attractive, needs further study? Is it the sense of satisfaction or the company of young students throughout their life which keeps the teachers also young, or is it one way of remaining up to date in the field of medical sciences?

The need for the training of teachers in medical education is reinforced by the rapid increase in the number of medical colleges during the last 20 years. This rapid expansion has necessitated the appointment of younger and to some extent inexperienced teachers in various departments of medical colleges. Such accelerated and premature promotion to senior appointments has perhaps been responsible for lack of full development of teaching faculties in them. It is all the more important when there is a constant demand for increase in the number of admissions which means handling of a larger number of students in a class room, a laboratory or hospital wards.

How to Teach

The essential requirement of medical teachers should be that they are competent to teach. Karl Pearson had said that “the true aim of the teacher should be to impart

an appreciation of method rather than knowledge of facts". This is perhaps an overstatement. The current practice for the recruitment of a teacher in a medical institution is to prescribe that he/she should have postgraduate qualification in a particular speciality, combined with teaching experience of some years, depending on the nature of the post from a Professor down to a Lecturer or Tutor. Are these two conditions adequate for the making of a good teacher? Judging by the recent advances in the science of education, the two criteria may not meet the requirements of a good teacher. While scholarship and excellence in the subject is an essential prerequisite, this does not necessarily equate with the qualities of a good teacher. There is no doubt that only a few highly qualified persons do make excellent teacher. Such gifted individuals, it has to be admitted, are not many. Most of the teachers today are hardly mediocre, if not poor, as they are not well equipped to perform the basic educational tasks in medical sciences. It is therefore necessary that potential teachers of medical colleges should study the science of medical education and should have a clear understanding of the tools and techniques employed in the education of their students, *i.e.*, be conversant with pedagogy. They must have adequate knowledge of the methods which may facilitate the process of learning by the students. Experience has shown that most individuals learn better when visual methods supplement auditory methods *i.e.*, audio-visual aids, but all individuals learn best by doing things themselves. An old Chinese proverb states "if we hear a thing we forget; if we see a thing, we remember; if we do a thing, we know". To this trio, Hobson has added a fourth maxim, "if we discuss a thing, then we know that we don't know". This saying brings out clearly the value of audio-visual aids, practical work by the students and the importance of group discussions by means of tutorials, seminars and workshops, etc. So far, the medical profession has shown little interest in the emerging science of education. It is not realised that there are well recognised principles of learning process, which can no longer be ignored. It has to be admitted that teaching is a task which needs help and guidance from those educationists who are well qualified and proficient in pedagogy and understand the implications of educational principles in Medicine. It is eminently desirable that at least two or three members from the faculty of at least one medical college in a region or state receive specialised training in educational colleges/institutes of a University. Only those members may be selected for this training who show real interest in educational science and who, after the requisite training, could form a nucleus for a separate department of medical education in their college and provide training facilities for other members of the staff of medical colleges in the region. A beginning seems to have been made in the All-India Institute of Medical Sciences, New Delhi, by establishing a small Unit for research in medical education. Its scope needs to be widened by including a study or investigation in teaching methods, etc. Way back in 1958, the Dean, Topiwala National Medical College, Bombay, had organised a course in pedagogy at Bombay for teachers in Medicine. The World Health Organization, South-East Asia Region, has also organized Seminars on Teaching Methods and Assessment of Examinations, in collaboration with Indian Association for the Advancement of Medical Education and Indian Academy of Medical Sciences. These sporadic efforts do not appear to have made any real impact on medical teachers in the country and not much attention has so far been paid by

them to ensure the application of educational theory to the teaching of medicine. If educational science has to take root in this country as it must do, then a sustained effort must be made by all the organisations interested in medical education. The Ministry of Health, the Medical Council of India, the Indian Council of Medical Research, the Indian Association for the Advancement of Medical Education and the Indian Academy of Medical Sciences must pool all their resources to give the science of education the same importance as any other branch of medical science. In U.S.A., several Medical Schools have started Units for research in the science of education. In the Hadassah University has established a Department of Medical Education. In U.S.S.R., the Health Ministry has taken Israel, keen interest in the science of pedagogy and established schools for the training of medical teachers. There is no reason why our country should lag behind in instituting similar courses for the training of potential medical teachers.

The promotion of proper teaching methods demands adequate teaching staff, modern teaching facilities and effective student-faculty relationship. Without reasonable resources, it would be futile to adopt the student-teacher ratio obtaining in U.S.A., but it is necessary that the full complement of teachers, per 100 students, as stipulated by the Medical Council of India, is provided in each medical college. The newer teaching methods involving seminars, tutorials and practical work in the laboratories and wards demand not only adequacy of staff in numbers, but also call for a great deal of individual teachers trained in preparatory work. The techniques being employed in the learning process, apart from the time-honoured system of didactic lectures and blackboard, are:

- (i) Phonocardiography and collective auscultation of patients
- (ii) Use of taped records
- (iii) Epidiascope
- (iv) Lantern slides and filmstrips
- (v) Cine films
- (vi) Models and specimens
- (vii) Closed Circuit Television
- (viii) Museum—comprehensive, all purpose
- (ix) Set problems and exercises
- (x) Programmed instruction

Detailed description of these techniques and their proper use may as well form the subject of another working paper. Suffice it to mention that the Teaching Museum should be comprehensive enough to include all disciplines—Anatomy and Embryology, Physiology and Pathology, Clinical features of the disease, its treatment, prevention

and rehabilitation. Perhaps the only museum of its nature in India is that of the Armed Forces Medical College at Poona. At least one such museum should be established in each region of the country.

The Indian Academy of Medical Sciences has made a modest beginning by establishing a small Films Library. Some three films have been made in India by our distinguished medical men. These films are being circulated to Medical Colleges and have proved useful. This activity needs expansion and strengthening.

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Medical Administration—A Speciality

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THE last few decades have witnessed tremendous changes in the social, political and technological field. The development in the field of technology borders almost on the spectacular. Medicine has shared in this tremendous advance, in the age-long effort to conquer disease and alleviate suffering. With every discovery, humanity breathes a sigh of relief, its hopes rise, in its expectations to share the benefits of these discoveries. The social and political awakening introduces an element of urgency in these aspirations.

The well-being and prosperity of a nation is dependent on an adequate investment in health. Health planning is an important part of the socio-economic development of a country. Agricultural and industrial enterprises require efficient human material. The vast outlay in health programmes is evident in all parts of the world. In India, the Plan allocation on public health and medical programmes is Rs. 437.50 crores, almost double the amount allocated in the Third Plan (Rs. 225.86 crores). Four hundred additional health centres will be opened and the existing ones strengthened. In the field of medical education, ten medical colleges will be established, bringing a total of 103 colleges with 13,000 annual admissions. The ratio of doctors to population which was 1 : 5150 in 1968 would be improved to 1 : 4300 in 1974. Similarly the number of nurses will increase from 66,000 to 88,000 and the number of hospital beds in Government hospitals would go up to 25,000 in the Plan Period.

This unprecedented growth in health facilities and programmes with all its complexities, calls for efficient planning, organization and management at all levels of the administrative structure. In India there are three levels, the Centre, the State and the District. The structure at the National level deals with long-range planning in health and man-power, the cost of each programme, the source of finance, and their priority to national health goals and our international obligations. The State, which has a large part of the health authority, has to cooperate with the Central authority in health programmes of national importance. The States have to deal and implement their own programmes in providing integrated health services and medical education. This involves proper organization and coordination in the delivery of these services

at the district level. This phenomenal growth and the complex organizational patterns of administration make it impossible, for anyone without having the requisite training, to undertake the task. The need of developing a corps of competent physicians to fill positions involving major administrative responsibilities, specially with the policy and advisory functions, has been increasingly realized. The Administrative Reforms Committee on Personnel Administration, recommends the development of training programmes for senior level technical administrators and recruitment to senior posts of specialists, and says¹ "If technical, scientific and other specialists have not adequately the necessary skills and qualities required for holding the higher administrative and managerial positions in the Secretariat, it is only partly because of aptitude factor, but mainly because they have not had opportunities for working in such positions early enough in their career and their development has not been properly planned".

The practice in the administration in the past has been one of "unalloyed generalism", a heritage of the British system, and in the words of the Fulton Committee which examined this system "it slows down the process of decision and management, leads to inefficiency, frequently means that no individual has clear managerial authority, and prevents specialists from exercising their full range of responsibilities normally associated with their professions....." The Administrative Reforms Committee, in defining the roles of the generalist and the specialist, says³ "The generalist has his place and an important one at that, in the scheme of things; but so has the specialist, the scientist, and the technologist. The problem really is one of harnessing their talents and capabilities through a purposive symbiosis in the larger interest of the common good, and of ending a practice which has tended to exclude the one in favour of the other, with its concomitant milieu of mutual sullen antipathy and supercilious snobbery".

The supply of medical administrators has not kept pace with the needs and demands of the health services. This lacuna in our services will have to be dealt with promptly and energetically. Senior administrative personnel will be required for the Central and State health services, Medical Colleges, Research Institutes and Hospitals. The World Health Organization Technical Report on Special Courses for National Health Staff for Higher Administrative Responsibilities⁴, lists the following functions:

- (1) advising on the formulation of health policy and the drafting of health legislation and regulations;
- (2) cooperating with governmental and other agencies concerned with various aspects of socio-economic development;
- (3) advising on large-scale planning and on the establishment of priorities;
- (4) coordinating and evaluating health programmes;
- (5) providing over-all supervision and leadership in implementation of programmes;

- (6) advising on the staffing of health services, on man-power requirements, and on the education of public health personnel;
- (7) administering research in public health (including operational research).

At the National Institute of Health Administration & Education, courses⁵ are now offered to give "a broad type of education for men and women to prepare them to be leaders in senior posts for the administration of integrated health services, including both medical care of the sick and conventional public health, for research workers in health administration, and for teachers of integrated health services". Since medical education and hospitals have to be more and more community-oriented, medical administrators in charge of these institutions would also benefit from a broad type of education.

Due to the complexity of operations, all aspects of administration in the medical field cannot remain the preserve of physicians. Competent non-medical personnel also play an important role. As examples, business officers in institutions and hospitals have come to stay. These officers relieve the medical personnel of purely business and administrative duties, enabling them to concentrate on the larger objectives.

It has been stated in the past that administrators are born and not made and that administration cannot be taught, but this concept has already been proved to be inaccurate. While the personality of a prospective administrator is undoubtedly one factor in determining his capability in this field, all individuals may profit from instruction in the principles and practice of administration and may thereby acquire some insights into the operation of a complex organizational structure. In this context, the training of administrators becomes imperative. Medical Administrators must be well-grounded in the concepts of general administration, educational methods, health and patient care, medical research and understand the social and economic impacts of health and illness as well as human relationships. An administrator with this background cannot be a super-specialist but a specialist among highly specialized workers, sufficiently knowledgeable to discriminate between the important and the unimportant, in the accomplishment of his objectives.

Even though the medical administrator will require a broad background as part of a "core programme", it will be necessary to have special training in the field of health service administration, medical education and medical research institutes and hospital administration, depending in which field the person operates. Courses in Hospital and Medical Care Administration have been formulated by the All-India Institute of Medical Sciences and by the National Institute of Health Administration & Education in Community Health Administration.

The training of Deans of Medical Colleges and Directors of Medical Research Institutes has not been formalized. Perhaps a programme in Staff Colleges may be organized for prospective teachers and research workers who aspire to be at the helm of affairs of their institutions. Here emphasis may also be placed, as in the case of other senior administrative personnel, on educational research, behavioural sciences, research methodology and operational research.

Having determined the need of training of medical administrators as specialists it is necessary to highlight some of their important functions. It involves planning organization, implementation, coordination, evaluation and control of activities of individuals and utilization of resources to achieve certain goals. As administration often leads to directing, guiding and restraining the (business and social) activities of other individuals or groups, it will have to be carried by their consent. The role of the administrator must be supportive and catalytic and the objectives carried out by education and persuasion. The administrator has also to maintain an effective system of communications with the various echelons of administration and with the consumer; the latter is the ultimate authority for testing and accepting, or otherwise, the values of the various programmes. Depending on the size and complexity of the institution, the administrator will have to learn how to delegate responsibility and maintain accountability as he has to work through others and with others. This is the area of sensitivity training.⁶

With costs in medical care and health programmes soaring, it will be necessary to study the desirability and effectiveness of these programmes. This duty will rest with the planners and administrators, to justify the propriety of expenditures, with the serious strain it places on the public exchequer; the problem is more acute in the developing countries with limited resources. Health administrators who have to compete for their share of funds with other high priority programmes, will have to adduce convincing reasons that the existing resources in money, manpower and facilities are used most efficiently and allocated rationally to achieve national needs of the present and of the future.

Unplanned and piecemeal development and growth by accretion, which characterizes many of our institutions, may give rise to undirected institutional momentum which may be difficult to combat as it will build empires with vested interests around them⁷.

A well-planned organization must have a built-in evaluation to measure achievement and for feed-back to correct deficiencies. It must also emphasize team work⁸ "democratic team work—centred around reality-centred leadership and characterized by free exchange of ideas, joint planning, group work, joint responsibility for success or failure, inter-dependence, and supportive supervision". This team work with freedom to individuals to operate and experiment in their own spheres of activity, will result in better outputs.

In the field of health in which many agencies are at work, the coordination of various agencies in a Regionalized Health Care Programme would be an advantage. In a developing economy with major problems to be solved, the administrator will be called upon to cooperate with and coordinate the activities of various agencies, governmental and voluntary. This is the concept of creative federalism, which strengthens the capacity of the State, local and private agencies to respond to the

challenges confronting them⁹. This concept of Creative Federalism "seeks to build a working relationship among the many separate institutions that share a capacity to effect the public good. Federalism means a relation, cooperative and competitive, between a limited central power and other powers that are essentially independent of it. The idea is not to supplant but rather strengthen the capacity of the State, local and private agencies to respond to the challenges confronting them."

And lastly an administrator may feel complacent that an institution or a programme has been set on a right path. Continuing thought has to be given to test the validity of the objectives and goals by an administration with a creative imagination and which is prepared to undertake a process of self-renewal or risk deterioration and obsolescence. In this connection, Gardner¹⁰, in stressing the importance of high standards stated that high standards were not enough. He added "there are kinds of excellence—very important kinds—that are not necessarily associated with the capacity for renewal. A society that has reached heights of excellence may already be caught up in the rigidities that will bring it down. An institution may hold itself to the highest standards and yet already be entombed in the complacency that will eventually spell its decline."

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Post-graduate Medical Education— Need for Re-appraisal

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POST-GRADUATE medical education in this country generally falls under four broad categories, (i) training opportunities and medical education after full registration, (ii) training and education over a certain specified period, leading to the award of a diploma or a degree in a chosen field of specialisation, (iii) post-doctoral training which might channellise him into a subspeciality, with or without the award of a degree and (iv) continuing education for a general practitioner helping him to keep abreast of the newer developments and thus enabling him to provide proper medical care, suitably orientated to the social and preventive aspects of medicine.

It is thus, clear, that post-graduate education starts at the completion of compulsory internship (rotating internship) which forms a part of under-graduate medical education. Post-graduate medical education is not aimed at correcting or remedying the defect of under-graduate medical education. It is not a repair workshop but is a production factory in its own right, aiming at an independent manufacturing programme. The raw material is the fresh graduate—the undifferentiated doctor—who is provided suitable opportunities and training facilities so that he acquires proficiency either to practise medicine of a reasonably good standard in the community, or specialises in the basic or paraclinical medical sciences or in the fields of general medicine, general surgery etc., or continues to differentiate further into a highly developed specialist, e.g., cardiologist, neurologist etc. This, in general, corresponds with the first three broad categories outlined earlier. I shall not dilate upon the continuing educational programme for general practitioners.

There are various facets of the post-graduate medical education leading to the award of diplomas and degrees. These include methods of selection, duration of the course, contents of the training programme, and methods of assessment. Considerable divergence of opinion exists regarding each of them. However, differences may considerably narrow down if we are clear as to our ultimate aim. The aim and objective of the training should be to produce a doctor who possesses the potentiality, if given suitable opportunities, to become a specialist, a teacher or an independent investigator. If there is a general agreement on this, then certain broad guidelines can

be proposed which may be applicable to both the clinical and non-clinical subjects. This would, however, exclude the short-term training programmes in specialities leading to diplomas such as diploma in tuberculosis, venereal diseases, tropical medicine, public health, maternity and child welfare, paediatrics, ophthalmology, otolaryngology etc. In the present context of the country, where communicable diseases and medical care in the rural areas constitute some of the major health problems, persons of this type are required in large numbers to man the district hospitals or more peripherally situated hospitals.

An important aspect, which merits serious discussion, is the place of subspecialities *vis-a-vis* the general disciplines. As far as the basic medical sciences are concerned, this problem has not arisen so far. A person can obtain a degree (M.D.) in physiology and later restrict his research interests in a field like Neurophysiology or cardiovascular physiology, etc. Nobody has yet proposed that there should be a separate degree in M.D. (neurophysiology). However, the situation may change twenty years hence. The problem is different, and perhaps genuine, in the disciplines of general medicine, general surgery and pathology. Now that such subspecialities have developed from the stage of infancy to adolescence (and some to the level of adulthood) in our country there is a growing opinion that the training facilities in these subspecialities should branch off at an early stage so that a person may be adequately prepared and suitably guided to obtain a degree like M.D. (Cardiology). In some universities, there is an M.D. in general medicine with a special subject like cardiology, haematology, dermatology etc. However, the argument is that the finished product is neither a physician nor a cardiologist. In the All-India Institute of Medical Sciences, dermatovenerology and paediatrics are already separate well-developed departments and the training in these leads to the award of M.D. in these subjects. However, there is no provision of a similar nature as far as cardiology and neurology are concerned. After having obtained the M.D. in general medicine, one may pursue research and training in these subjects leading to the award of D.M. An analogous situation exists in relation to Urology where M. Ch. is awarded after M. S. in general surgery.

Most people in general disciplines think that a candidate must do M.D. or M.S. in general disciplines first before he branches off in a speciality or a subspeciality. The specialists, on the other hand, are of the opinion that such a step will discourage a student from coming into these subjects because the time taken for such specialisation will be too long and that indirectly it will preclude the post-graduates—especially the brilliant students—from taking up such a course. Admittedly, there is a good deal of logic and reason in this line of thinking. The solution perhaps lies in not having any rigidity in this matter but to prescribe as the American Boards do, proper training courses in the general discipline for each subspeciality according to its needs. A neurosurgeon and a neurologist and a cardiologist will probably need longer courses in general surgery and general medicine before branching into the subspeciality and getting a degree in that. A dermatologist may not perhaps need such a long training in general medicine.

The methods of selection pose another problem. Basically, there is a unanimity of opinion that the sole criterion should be merit as the resources of the country are limited and only the most deserving students should be able to avail themselves of this privilege of post-graduate education. However, the real difficulty lies a little ahead when merit has to be suitably defined and objective criteria laid to judge it. The question is of utmost importance as the quality of a finished product is always dependent on the raw material used in the manufacturing process. Whatever our standard of training may be, the ultimate quality of our specialists and teachers will depend upon the type of the post-graduate student that we select at the time of admissions. In the A.I.I.M.S., during the first few years, the admissions were made on the basis of certain formulae which took into consideration the marks obtained in various professional examinations, the number of attempts made, and any prizes, medals or distinctions obtained during the under-graduate career. Later, additional credit based on the performance during internship and house job was given. However, it was soon realised that the performance of students during the post-graduate course varied considerably, even if they had 'equal' merit on paper at the time of admission. Evidently, the percentage of marks and medals and honours in one University are not necessarily equivalent to the same percentage etc. in another University. A short interview usually leads to nowhere. Therefore, for the last few years, an interview lasting over a day or two is conducted for purposes of admission, in addition to the consideration given to the merit, as judged from academic career. In the Department of Medicine at the A.I.I.M.S., a short written examination, based on a multiple choice type of question paper, is also conducted. The candidates are, at times, taken round the wards and laboratories where the faculty members judge their clinical acumen, technical skills, and research aptitudes. A total appraisal of all these parameters leads to the final selection. It may be too early to say that this is the most suitable method. But, this certainly warrants a re-appraisal after sometime when the performance of the students during the post-graduate course as well as their professional and academic achievements after having obtained the degree, can be correlated with the credits obtained at the time of selection for admission.

The next question, which is equally important, is that of duration and content of course. This has a direct bearing on our aims and objectives of post-graduate medical education. In the A.I.I.M.S., during the early years, the duration of the course for the post-graduate degrees was two years after one year of house job for all subjects. This meant a 3-year training period (excluding one year of internship or rotating housemanship) in the clinical subjects. The student was expected to complete a research project and write an acceptable thesis which usually took about a year or a year-and-a-half. Thereafter, in spite of an intensive training on the clinical side and a corresponding earnest effort on the part of the student, the results were not very rewarding. It was then realised that a minimum of 4 years is essential, out of which one year will be spent in the house job, and 3 years will be spent in a full-time post-graduation course. This system is now in operation in all the clinical subjects as well as in the subject of pathology, while the course remains of 2 years duration after one year of house job in other subjects.

A pertinent question asked then, and being repeatedly asked now, is that if the Royal Colleges of Physicians (& Surgeons) of the U.K. can allow the candidates to appear after a shorter duration (for instance, the condition for appearing in the M.R.C.P. examination is 2 years after graduation for R.C.P., London; and 3 years after graduation for R.C.P., Edin.) and produce equally competent physicians and surgeons, why cannot the same be achieved here in the same duration of time. However, the background of M.R.C.P. and F.R.C.S. examinations is rather different. The award of M.R.C.P. or F.R.C.S. only entitles a candidate to secure a job of a Senior Registrar. After having worked as a senior registrar for 2 years, various avenues are open to him. He may get interested in a teaching and research career, pursue a research project and obtain the M.D. Degree. However, he may go out to a 'Peripheral' hospital as a consultant without being involved in formal undergraduate and postgraduate teaching. Research thesis is not a prerequisite as far as M.R.C.P. or F.R.C.S. is concerned. Obviously, therefore, no time is spent in carrying out a research project or writing a thesis, thus leaving more time for the clinical training and for the attainment of the knowledge of the available literature on the subject. We, on the other hand, aim at a training programme which ensures also an exposure to the methodology of research and combines partially the training, that a post-graduate gets in the U.K. for doing his M.D. & M.R.C.P. Moreover, soon after obtaining M.D. in this country, he may be required to do a lot of independent work and thus, may, not get those opportunities of training which an M.R.C.P. or an F.R.C.P. gets in the hospitals in the U.K. in the early stages of his career.

This brings us to the next important and an intimately connected aspect of post-graduate medical education. If writing a detailed thesis is a time-consuming project, why not dispense away with this? Can it or should it be reduced to the standard of a dissertation? Should the practice of submitting a few case sheets in lieu of the dissertation or thesis as is the practice in some universities be continued? All these aspects have received considerable attention from the various authorities in the field of medical education. However, my personal views are that the practice of submitting 20 or more case histories in lieu of the dissertation or thesis should have no place in the requirements for the award of M.D. Similarly, a dissertation does not do full justice to our aims and objectives of producing a doctor who is well-orientated in the methodology and the techniques of research and who has attained the potentialities of becoming an independent investigator at a later stage in his professional career. Besides this, a well-planned research project, properly executed, confers certain other advantages. It imparts to a considerable degree the qualities of critical thinking, scientific approach and unprejudiced appraisal of the available literature provided he has a good guide while working on his thesis. These qualities are a great asset even in the clinical field. When a patient is examined, the same essential qualities help us in arriving at a proper diagnosis. We review all the signs and symptoms, discuss the differential diagnosis, place reliance on the reports of the laboratory investigations and then reach a diagnosis. However, a thesis becomes a proper medium of imparting these qualities and furthering our aims on medical education at the post-graduate level, only if it is well-planned and suitably guided by an experienced supervisor. The usual practice of a Head of the Department

guiding the theses of a large number of post-graduate students, at a time, can never achieve this aim.

It has been suggested that in a three-year course for M.D. (Medicine), some division of time should be made. The student should adequately prepare himself in the clinical aspects, theoretical aspects and in the understanding of basic medical sciences in the first two years, at the end of which he may appear in an examination. After having passed this examination he should devote one full year completely to research project and write his thesis so that the degree may be finally awarded to him in case the thesis is acceptable. Though there may be advantages in this type of proposal, there are certain obvious handicaps which have to be kept in mind. Firstly, it may not always be possible in a year to plan a project, gather all the necessary equipment, learn the techniques involved, standardise methodology and then design suitable experiments, collect the necessary data, subject it to a critical analysis, draw valid conclusions, prepare a bibliography and finally get it properly typed and bound. This means that if the project cannot be completed in one year, the student will have to spend more time and this would necessarily lengthen the course. On the contrary, the student may be in a hurry to finish the project and may confront us with conclusions which are based on unsound logic, invalid techniques and half-baked observations. In addition, there is another strong objection to this type of proposal. Usually, a clinical teacher in his professional career has to act as a clinical consultant, teacher and an investigator simultaneously. Therefore, it may be desirable to inculcate this habit of taking these three roles simultaneously from the very beginning. This emphasises the fact that the laboratories cannot be isolated from the wards. However, both these proposals merit serious consideration and hence can be looked into. The P.G.I., Chandigarh, has already started this experiment of writing thesis after the qualifying examination. The experiment is worth watching.

How should the post-graduate training be imparted? What should be the content of the post-graduate course? Different systems prevail in various universities as far as the clinical subjects like general medicine and general surgery are concerned. For example, in some universities only a six month attendance in a recognised hospital is compulsory. The course is based on a non-residency type of pattern. No clinical responsibilities are assigned to the students. They are only expected to attend ward rounds, clinical demonstrations and other similar programmes. The concept of a whole-time post-graduate course, as is prescribed in some of the universities, or at the P.G.I., Chandigarh, or the A.I.I.M.S., is not being practised in most of the universities. The Post-graduate Committee of the Medical Council of India is impressing upon all universities to change such systems and start a residency type of programme. Even if money is found to finance scholarships and the concept of whole-time course is accepted and popularised, there may be differences of opinion as regards the most suitable methods of training.

Residency system of training is infinitely superior to a non-residency type of programme. So far as the clinical training is concerned, it can achieve the best possible

results by giving responsibility of patients' care to the post-graduate student. Attendance at ward rounds, clinical conferences, bedside demonstrations, research seminars etc. is undoubtedly very important, but until and unless a student is entrusted with the responsibility for the routine and emergency management of the case under his care, it is unlikely that he would achieve high standards of efficiency and competence as a physician. However, care should be taken to allocate only a small number of patients to his care. He should not be a substitute for a House Physician. He should be encouraged to consult the library, look into the various aspects of diagnosis and management concerning the patients under his care, and make suggestions which may significantly contribute to the better medical care of the patient. The post-graduate student (a clinical resident) should be available for emergency night duty, should watch and assist in various special procedures like renal or liver biopsy being undertaken on his patients, and should be able to establish a confident doctor-patient relationship in his own right as a treating physician or surgeon. Similarly, the post-graduates in general surgery should actively assist and later be able to perform certain surgical procedures, under the care and guidance of their teachers. The skill of management, whether medical or surgical, comes only by practice.

Clinical case conferences, journal clubs, seminars, research reviews, interdepartmental clinical conferences, speciality clinics are all accepted as suitable devices to impart the necessary training. However, there are two areas where a re-appraisal is necessary. One of these concerns the place of basic medical sciences in the training for clinical subjects. Similarly, the teaching of applied aspects for the post-graduates who are working in basic medical sciences merits serious consideration. This will produce teachers in basic medical sciences who will be better oriented towards teaching the under-graduates the applied aspects of these sciences. For the post-graduates in clinical subjects, this technique may help to produce teachers with a sound knowledge of fundamental principles based on scientific background, and with an aptitude for research.

This coordination and integration can be achieved in various ways. It has been suggested that there should be a course of didactic lectures in basic medical sciences. Another suggestion is the posting of the clinical students in basic medical sciences for a particular duration. However, both these suggestions suffer from a serious disadvantage. They tend to isolate the basic medical sciences from the clinical disciplines. What is needed is a clinician who constantly learns the fundamentals and applies them in his day-to-day clinical work. Any isolated course or a posting strikes at the very roots of this integration concept. I strongly advocate a concurrent training. This can be achieved by ensuring that a post-graduate student attends regularly pathology conference where biopsy or autopsy material from the patients is discussed. For example, it will be rational for a post-graduate in medicine to study the clinical and biochemical parameters of case of nephrotic syndrome under his care, assist in the renal biopsy procedure, examine the histopathology of the tissue sections and discuss this with the pathologist, and later, by further follow-up of the patient, learn the correlation, if any, between the histopathological picture and the response to therapy. Similar collaboration in training with the departments of Biochemistry and Physiology should

be essential. To my mind, this is an ideal way of learning the basic medical sciences. The same applies to post-graduates in surgical disciplines. Such a training on a reasonable scale is, however, not possible in a two-year course. For this purpose also, the additional third year will be necessary. However, there is a place for a short course dealing with the handling of laboratory equipment, the principles of electronics, experimental animals and their behaviour, biostatistics, etc. A course on similar lines is already being conducted at the A.I.I.M.S. and the attendance is compulsory.

The second problem concerns the training of the post-graduates in teaching methods. As one of the aims of the postgraduate education is to produce competent teachers, due care and consideration should be given to this problem. The only way in which the post-graduate can learn this is by teaching the under-graduates. This will mean that the presence of under-graduate students on the same campus serves a distinct purpose. It is advantageous to both. The post-graduate gets an opportunity to participate in the teaching programme while the under-graduate is benefited from the academic atmosphere generated by and associated with the research and training of the post-graduates.

The methods that should be employed in the assessment of a post-graduate student also need revaluation. There should be a day-to-day assessment of the students, especially if they are undergoing a residency type of training and have been assigned a responsible task as regards patient care. In addition, their aptitude for learning methodology of research and laboratory techniques, their efforts to learn from their teachers and the habit to consult the library, especially concerning the current advances, and their attitude towards their patients must all be evaluated. Their capability as a teacher should also be assessed. The deficiencies should be pointed out to the student so that a sincere effort may be made by him to overcome these handicaps. In addition, periodical tests based on objective type of questions and *viva-voce* associated with an assessment of the clinical acumen of the students in the wards, are of considerable help. All these should constitute the internal assessment and due weightage should be given to this, especially in deciding the fate of the marginal candidates at the time of the final examination.

The final examination should consist of theory papers and clinicals. In the theory papers, one paper should be reserved for the applied aspects of basic medical sciences. In some universities there is a Part I examination, analogous to the preliminary F.R.C.S., where the questions relate to the basic medical sciences. Similarly, in the basic medical sciences there should be a paper on the applied aspects of that science. These papers should be of the objective multiple choice type questions.

Both in the theory examination and in the *viva-voce*, an attempt should be made to frame the questions in such a way as to invite the comments and critical judgement of the student, besides assessing his factual knowledge. There is a place both for the multiple choice type objective questions and the essay type of questions. These are pitched at different levels. The objective type questions are more helpful to know the factual knowledge while the essay type questions tend to bring out the

power of logic, critical analysis and expression of the student. Both are, therefore, complementary to and not mutually exclusive of each other.

The clinical examination in most of the universities is restricted usually to one long case and about two short cases. A *viva-voce*, which usually lasts for about 10-15 minutes, is also conducted. It is obvious that a student who, unfortunately, has missed a clinical finding or a diagnosis in one of these three or four cases or has not spotted out a skiagram or an electrocardiogram correctly, runs the great risk of being declared unsuccessful in the examination. It is imperative, therefore, to conduct a more detailed clinical examination in which the student is given a reasonable opportunity to show his clinical acumen. If the number of candidates is more than 5 or 6, the examination should certainly be spread over two to three days so that only those candidates are declared unsuccessful about whom we can be justifiably sure that additional training of 6 months to one year would be necessary and would enable them to gain further knowledge so that they may reach the desired standards.

The award of the degree of Ph.D., both for the clinical subjects and the basic medical sciences, should be mainly based on the excellence of the research conducted and the thesis written under the supervision of a qualified guide. To encourage research in clinical subjects, it would be desirable and advisable to have Ph.D. in experimental medicine also. The course should be at least of two years duration for those who have already done M.D. or M.Sc. These candidates with post-graduate degrees have already been benefited by a broad-based training and, therefore, a further period of two years should be considered sufficient for their research project for the award of the degree of Ph.D. However, those universities which are allowing candidates with M.B.B.S. qualification to undergo training for Ph.D., should have a three or four years course out of which one to two years should be spent on getting a broad-based postgraduate training and further two years in intensive research, so that they can pursue the chosen project for the award of Ph.D.

An attempt has been made to review and highlight the various problems of post-graduate medical education in this country. It is obvious that it is a multifaceted problem and no decision can be taken without giving serious consideration to all its aspects. An agency like the Medical Council of India, which has achieved considerable success in maintaining uniform standards of undergraduate medical education, can certainly make a significant contribution in achieving the aims and objectives of post-graduate medical education as well, and this is the main function of its Post-graduate Committee.

